NAVIPAC

SENSOR INTERFACING

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1 Interfaces

In this document, the available instruments that NaviPac currently interfaces to are described. For each instrument, we give a short identification of the input string allowed for correct interpretation. If the sensor outputs more than the desired string, a string selection must be specified in the driver details.

The EIVA number refers to EIVA identification of the instrument and is, for example, used in the interpretation DLL ("Inst<nnn>.dll"). For a detailed list of instrument numbers, please refer to the file instype.h.

2 Interface description

2.1 Surface navigation

Instrument	EIVA ID	Format
AGA Geodimeter	38	Dedicated label protocol – NaviPac uses label 7, 8 and 9.
Artemis - driver 2	15	"A<Azimuth><CR><LF>" "D<Range>CR><LF> or "<Azimuth > < Range > <Status> <CR><LF>" or "<Code><Range><Azimuth><CR><LF>"
Artemis MK3	7	
Artemis MK4	8	
Ashtech GPS1	42	Ashtech NMEA GPS: GPS, Differential or RTK. "$..GGA, time, Latitude, N/S, Longitude, E/W, Quality, # Satellites, HDOP, Antenna Alt., Unit, Geoidal separation, Unit, Age, Diff ID <CR><LF>" Does also support other NMEA message for status information. To fulfil UKOOA standards, please use GSA and GST. **DO NOT USE FOR STANDARD GPS DRIVERS AS BEHAVIOUR IS SLIGHTLY DIFFERENT.**
Ashtech GPS2	43	
C-Nav GPS 1	29	C&C TRIN format or standard GGA telegram.
C-Nav GPS 2	30	
Edgetech 4600 (NaviScan)	59	Position information (routed via NaviScan) in binary networked format.
Fanbeam	9	"RrrrrrBbbbbbASF<CR><LF>" (MK II Format) or "nn rrrr.rr bbb.bb<CR><LF>" (Standard MDL)
Fanbeam - driver 2	16	
Free Position input	19	Any CR/LF-ended string containing position as X and Y. Items must be delimited by a comma, semicolon, space or equals sign or defined by fixed length.
Geco-Prakla GPS 1	48	Standard format utilised for UKOOA data monitoring.

Instrument	EIVA ID	Format
Geco-Prakla GPS 2	49	TRINAV: "[0101xxvvvvvvvvvvwwww<time><age><latitude><longitude><height> <UKOOA info>]<CR><LF>" GECO3: $WGPOS,vers,no,name,gps week, timestamp,age,lat,long,height,hdop,vdop,uv, varLat,varLon,varH,ER,fix, ct,ct,#sat,#ref,sats used,ref id,]
Geco-Prakla GPS 3	51	
Geco-Prakla GPS 4	52	
Geco-Prakla GPS 5	53	
Geodimeter ATS 3D	39	Dedicated label protocol – NaviPac uses label 7, 8 and 9.
GPS1 (NMEA)	44	Any NMEA-based GPS giving the following information: "$..GGA, time, Latitude, N/S, Longitude, E/W, Quality, # Satellites, HDOP, Antenna Alt., Unit, Geoidal separation, Unit, Age, Diff ID <CR><LF>" "$..,GGK, UTC, Date, Latitude, Longitude, Quality, NoSat, DOP, Height<CR><LF>" "$..GLL … <CR><LF>" "$RTLLQ,hhmmss.s,mmddyy, Easting, m, Northing, m, Quality, NoSat, DOP, Height<CR><LF>" "$PSBGO,LPI,Easting, Northing, Height,,T" – only for GPS1 & 2 NaviPac is set up to use $GPGAA as default. If the instrument outputs another string (eg $XXGGA), you must change a string filter defined in the instrument details. To fulfil UKOOA standards, please use GSA and GST.
GPS2 (NMEA)	45	
GPS3 (NMEA)	56	
GPS4 (NMEA)	57	
GPS5 (NMEA)	58	
Hyperfix	27	"<Code1><LaneId1><LaneRange1> … <Code8><LaneId8><LaneRange8><CR><LF>"
Kongsberg HiPAP/APOS	4	Fixed station: "$PSIMSSB,hhmmss.ss,tp,Status,error,coord,orientation,sw,x,y,depth, ... <cr><lf>" or binary HPR400 format. See dynamic positioning.
Kongsberg HPR 300	2	Fixed station: Binary BCD data: <head> <roll[2]> <pitch[2]> <course[2]> <tp_id> <X_R[3]> <Y_B[3]> <Z_D[3]> <stat> <timeout> < TPs[3]> < TDAngle[2]> < test> <type> <specification> <transducers> <Tdstatus> < KalmanWindow> <checksum> <eot> where <eot> equals 40H
Kongsberg HPR 300P	3	Fixed station: "TT X N SSS CCC.C xxx.x yyy.y zzz.z qq.q nnn tt.t aaa.a<cr><lf>"
Kongsberg LBL	12	Fixed station: "$PSIMLBP,<time>,<tp_array>,<Type>,<state>,<coordinates>,<easting>, northing>,…\r\n" Coordinates must be 'E'.
Laser Meter	22	"<Range> <CR><LF>"
Leica GPS1	46	Leica MC1000 system: Can also use ordinary GGA message.

Instrument	EIVA ID	Format
Leica GPS2	47	Binary format – Id equals 0x2: <Sync> <Length> <Id> <GPS Cl> <source> <pos des> <Pos fail> <Datum> <Lat> <Long> <Height> <Check>
Leica Total 1 (R/B)	40	Based on the GSI format giving slant range, horizontal angle and vertical angle. "…. 21<hor. Angle> 22<vert. Angle> 31 <slant rang> … <cr><lf>"
Leica Total 2 (R/B)	41	
Microfix	17	"<Filter> <Event> <hhmmss> <X> <Y> <Line> <Offset> <DTG> <Code1> <Range1> … <Code8> <Range8> <CR><LF>"
Microfix II	18	"<Filter> <Event> <hhmmss> <X> <Y> <Line> <Offset> <DTG> <Code1> <Range1> … <Code8> <Range8> <CR><LF>"
Motorola MiniRanger	11	"<HH,MM,SS.S>, <Code1>, <Range1>, <Strength1>, …, <Code4>, <Range4>, <Strength4> <CR><LF>"
NASNetR BOAT	37	$NASPOS,<time>,BOAT,<lat>,N/S,<long>,E/W,<height><checksum>
Nautronix RS9**	14	Fixed station: "<Date> <Time> B:<Target> X:<delta X> Y:<delta Y> D:<depth> … E:<Error code><CR><LF>"
ORE Trackpoint II	1	Fixed station: TP-II:"<target> <time> <heading> <bearing> <range> <X> <Y> <Z> .. <CR><LF>" LTX: "<target> <range> <bearing> <depression angle> …<CR><LF>"
Polartrack	13	"<Range> <Bearing><Vertical bearing> <CR>"
Position from EdgeTech MIDAS	26	"$GPGXY,<x>,a,<y>,b,<time>*<h><CR><LF>"
POSMV Group 1	35	Position and height from POSMV – using network UDP/IP protocol Group 1.
Racal UKOOA GPS 1	50	[LVT**<utc><data><age><datum><latitude><longitude><height><ukooa parameters><cr><lf>
Remote NaviPac	20	Using the NaviPac remote format: <stx><id><easting><northing>… Does not support more than one string on port, as it ignores id. If used with multiplexed, id number '0' is assumed to be vessel.
Sea-diff / Skyfix	28	"[1123mmddyyHHMMSS.S01.21N540853.17E0090000.00+0012.3111.1222.2111.1222.233344455.566.67788999112233344556667788999123456789111111 1] <CR><LF>"
Sercel NS230	36	Any NMEA-based GPS giving the following information: "$..GGA, time, Latitude, N/S, Longitude, E/W, Quality, # Satellites, HDOP, Antenna Alt., Unit, Geoidal separation, Unit, Age, Diff ID <CR><LF> " "$..,GGK, UTC, Date, Latitude, Longitude, Quality, NoSat, DOP, Height<CR><LF>"

Instrument	EIVA ID	Format
Syledis SB5	21	"<Code1> … <Status1> <Partial Range1> … <Code8> … <Status8> <Partial Range8> <CR> <LF>"
Syledis STR3/SR4	5	"<hhmmss> <Code1>d1 R<Range1> …. <Code8>d1 R<Range8><CR> <LF>"
Syledis XY	6	"X<easting> Y<northing><CR><LF>" or "L<Latitude> G<Longitude><CR><LF>"
Topcon GPS 1	31	Topcon NP format or standard GGA telegram.
Topcon GPS 2	32	
Topcon GPS 3	33	
Topcon GPS 4	34	
Topcon Total Station 1	54	Q<range>m<Vertical angle><Horizontal angle>g...<cr><lf>. Angle in gons or degrees.
Topcon Total Station 2	55	
Trimble 4000 - 1	24	"ddddddd tt:tt:ttMdd:mm.mmmmmmN ddd:mm.mmmmmmE hhhhhh.hhh pp.p ....<CR><LF>" Does also allow NMEA messages.
Trimble 4000 - 2	25	

2.2 Gyro

Instrument	EIVA ID	Format
NMEA1 Gyro	104	"$..HDT, <gyro><cr><lf>" or "$..TSP, <gyro><cr><lf>" or "$..HDM, <gyro><cr><lf>" You can change between different string layouts by using the string prefix definition in the instrument details.
NMEA2 Gyro	105	
NMEA3 Gyro	106	
Anschutz (NMEA)	153	"$..HDT, <gyro><cr><lf>" or "$..TSP, <gyro><cr><lf>"
Anschutz (Std. 20)	121	Binary std. 20 format: <stx><gyro><chg><mc1><mc2><rot><status><compass><chk><eot>
CDL RLG	128	H<gyro>P<pitch>R<roll><cr><lf> Supports RLG1 (decimal degree) and RLG2 (integer in 1/100 degree).
CDL Tokimec2 Gyro	135	$PTVF,pitch,roll,gyro,PR,RR,AR,Speed,yyy,Status*xx<cr><lf>
Constructed Direction	159	Gyro calculated by the use of two objects – as it uses direction from the base object to the objects it is assigned to.
CTC Trencher Gyro	108	Special CTC (SCS) data format. ",GGGG,...<cr><lf>"
Digilog Gyro	103	Does also cover Trimcube format. "HggggPpppppRrrrrr,S<CR><LF>" – gggg is gyro in 1/10 degree.
Edgetech 4600 (NaviScan)	136	Heading information (routed via NaviScan) in binary networked format.

EM3000 HQ Gyro	134	Binary EM3000 format – accepts only highest quality (0x90 start).
Gyro from RTK GPS	155	Gyro calculated by the use of two different located RTK GPS antennas. Should only be used as secondary gyro. NaviPac automatically selects the two first RTK-based systems.
HMR3000 Gyro	133	$PTNTHPR,<gyro>,S,<pitch>,S,<roll>,S,kk<cr><lf>
Innovator3 Gyro	123	”$PSSI,H ggg.g,P pp.p,R rr.r,D ddd.d,A aa.a*<chksum>
Kongsberg $PSIMSSB	129	$PSIMSSB,<time>,B<id>,A,,C,H,M,-8.00,-37.95,81.56,0.20,*C,<compass>*,*79*
Kongsberg HiPAP Gyro	102	“$PSIMSNS, <time>, <PosItem>, <Transceiver>, <Transducer>, <Roll>, <Pitch>, <Heave>, <Heading>, ...,<cr><lf>” or binary HPR400 format. See dynamic positioning.
Kongsberg HPR300 Gyro	100	Binary BCD data: < head> <roll[2]> <pitch[2]> <course[2]> <tp_id> <X_R[3]> <Y_B[3]> <Z_D[3]> <stat> <timeout> < TPs[3]> < TDAngle[2]> < test> <type> <specification> <transducers> <Tdstatus> < KalmanWindow> <checksum> <eot> where <eot> equals 40H
Kongsberg HPR300P Gyro	101	“TT X N SSS CCC.C xxx.x yyy.y zzz.z qq.q nnn tt.t aaa.a<cr><lf>”
Kongsberg LBL Gyro	112	"$PSIMLBM,hhmmss.ss,0,1,<roll>,<pitch>,<heading>,,1,2,3,4,5,6,7,8,M\r\n „
Kongsberg SDP Gyro	115	“$PSALS,0.0,7.0,<gyro>,<gyro valid ?>,<roll>,<pitch>,<R/p valid ?>*<check sum>\r\n”
KVH Gyro Track	111	“%<pitch>,<roll>,<gyro><CR><LF>”
Lemkühl: NMEA HDT	154	“$..HDT, <gyro><cr><lf>” or “$..TSP, <gyro><cr><lf>” or “$..HDM, <gyro><cr><lf>” You can change between different string layouts by using the string prefix definition in the instrument details.
MAGNUM ROV Gyro	124	” : aa.aa ddd.dd gggg rrrrrr pppppp<cr><lf>
Manual Gyro	122	Fully controllable (individually for each object) manual gyro input. Does also allow motion sensor input.
MDL	127	H<gyro>P<pitch>R<roll><cr><lf> Gyro 1/10 degree.
NASNetR Gyro	130	$NASCRD,<time>,CR4,H,<gyro>*5E
Nautronix RS9** Gyro	107	“….H:<gyro>….<CR><LF>”
NaviPac (Remote)	120	Calculated instrument based on input from another vessel using NaviPac.
Octans gyro (Ixsea)	117	Ordinary NMEA $HEHDT.
PHINS/ROVINS Gyro	138	$PIXSE, HSATIT (done via special PHINS IF module).

Plough Gyro ($SMD)	131	$SMD,Pitch,Roll,Heading,Tow Force,Burial Depth,Tension,Port Skid Height,Stbd Skid Height, Share Angle, Water Depth, Cable Dist, Steer Angle<CR><LF>
Posidonia	118	$PCVMB,<frame>,<time>,<dd>,<mm>,<yyyy>,000,<roll>,<pitch>,<gyro>,<cr><lf> or $PTSAZ,#NNNNN,HHMMSS.SSS,JJ,MM,AAAA,#PTSAW,R,C.CCC,R.RRR,T.TTT,L.LLLL,L.LLLL,X.XXX,Y.YYY,Z.ZZZ,
POSMV Gyro 102/103	126	Heading from POSMV – network telegram (Group 102).
PRDID: Gyro	132	$PRDID,Pitch,Roll,Heading<cr><lf>
RDI DVL Compass	116	Binary PD0 format.
Robertson RSG-4	114	"$<gyro>,N,000,+56,00,<pitch>,<roll><CR><LF>"
Robertson SKR80	156	Binary 4-byte Robertson format.
ROV Solo Gyro	110	" …G<Gyro>….<CR><LF>"
S.G. Brown	157	"GGGg<cr><lf>" – g is in 1/6 degree.
ScanFish III Gyro	139	$SF,Fish,<gyro>,<roll>,<pitch>,<depth>,<altitude> Note – this is not a true value – just rough heading indicator.
SCV ROV Gyro	109	Stolt Core Vehicle. "...HE<Gyro>...<CR><LF" or "...G<Gyro>...<CR><LF" or "...H: <Gyro>...<CR><LF"
Seapath	158	Binary EM3000/1000 compatible or Seapath NMEA format: <Head[2]><Roll[2]><Pitch[2]><Heave[2]><Heading[2]>, where Head equals 90H, 90H (EM3000) or 0H, 90H (EM1000). $PSXN,23,roll,pitch,head,heave*csum <cr><lf> Selection of format must be performed in instrument setup.
Sonardyne APS3	119	Calculated instrument based on input from Sonardyne APS-3.
Topcon RTK Gyro	125	Standard NMEA $GPHDT or Topcon-specific $PTPSR,ATT message. To change between the two, please change the string prefix in the instrument details: $PTPSR,ATT vs $GPHDT.
Triton XL ROV Gyro	113	"$PPTIROV,<gyro>,<depth>,<altitude>,<pitch>,<roll>,<CP1>,<CP2>,<Tel>,<note><cr><lf>"
User defined Gyro 1	197	Any ASCII string with either byte count or separators.
User defined Gyro 2	198	
User defined Gyro 3	199	

2.3 Motion sensor

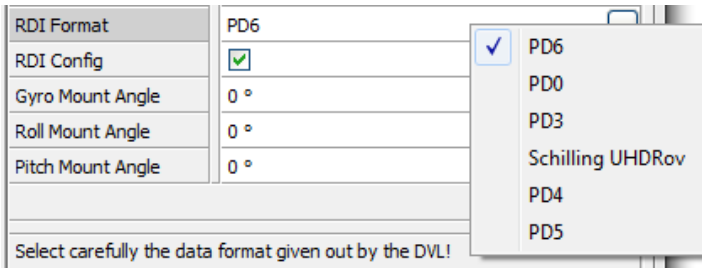
Instrument	EIVA ID	Format

CDL RLG	228	H<gyro>P<pitch>R<roll><cr><lf> Supports RLG1 (decimal degree) and RLG2 (integer in 1/1000 degree).
CDL Tokimec2 RP	235	$PTVF,pitch,roll,gyro,PR,RR,AR,Speed,yyy,Status*xx<cr><lf>
CTC Trencher <Motion>	206	Special CTC (SCS) format. “,gggg,pppp,rrrr,...<cr><lf>”
Digilog Motion	204	Does also cover the Trimcube format. “HggggPppppRrrrrr,S<CR><LF>” – ppppp is pitch and rrrr roll in 1/10 degree.
Dynabase CRU Atlas	210	<DLE><Roll><Pitch><Heave><Q><DLE>
Edgetech 4600 (NaviScan)	236	Motion information (routed via NaviScan) in binary networked format.
EM3000 HQ RPH	234	Binary EM3000 format – accepts only highest quality (0x90 start).
Hippy Motion sensor	209	Special voltage information. Requires National Instruments A/D board.
HMR3000 R/P	233	$PTNTHPR,<gyro>,S,<pitch>,S,<roll>,S,kk<cr><lf>
Innovator3	223	”$PSSI,H ggg.g,P pp.p,R rr.r,D ddd.d,A aa.a*<chksum>
Ixsea RPH (B&A Format)	217	$PHTRH,<pitch>,M/P,<roll>,B/T,<heave>,U/O\r\n $PHTRO,<x.xx>,<a>,<y.yy>,<b>*hh<CR><LF> (roll & pitch) ":aaaaaasnhhhhqnrrrrrsnppppp<cr><lf>" (TSS) $PIXSE, ATITUDE (PHINS) Corresponds to the IXSEA format called B&A Standard. The ‘only’ difference between B&A and GYROCOMPASS is the sign convention of Heave: B&A: O for Up and U for Down GYROCOMPASS2: U for Up and O for Down
Ixsea RPH (GYROCOMPASS2)	216	$PHTRH,<pitch>,M/P,<roll>,B/T,<heave>,U/O\r\n $PHTRO,<x.xx>,<a>,<y.yy>,<b>*hh<CR><LF> (roll & pitch) ":aaaaaasnhhhhqnrrrrrsnppppp<cr><lf>" (TSS) Corresponds to the IXSEA format called GYROCOMPASS2.
Kongsberg HPR300	201	Binary BCD data: < head> <roll[2]> <pitch[2]> <course[2]> <tp_id> <X_R[3]> <Y_B[3]> <Z_D[3]> <stat> <timeout> < TPs[3]> < TDAngle[2]> < test> <type> <specification> <transducers> <Tdstatus> < KalmanWindow> <checksum> <eot> where <eot> equals 40H
Kongsberg HPR400	202	“$PSIMSNS, <time>, <PosItem>, <Transceiver>, <Transducer>, <Roll>, <Pitch>, <Heave>, <Heading>, ...,<cr><lf>” or binary HPR400 format. See dynamic positioning.
Kongsberg LBL Motion	212	"$PSIMLBM,hhmmss.ss,0,1,<roll>,<pitch>,<heading>,,1,2,3,4,5,6,7,8,M\r\n „
Kongsberg SDP R/P	215	“$PSALS,0.0,7.0,<gyro>,<gyro valid ?>,<roll>,<pitch>,<R/p valid ?>*<check sum>\r\n”

KVH Gyro track	211	"%<pitch>,<roll>,<gyro><CR><LF>"
MAGNUM ROV R/P	224	" : aa.aa ddd.dd gggg rrrrrr pppppp<cr><lf>
Manual RP	222	Fully controllable (individually for each object) manual motion sensor input. Does also allow gyro input.
MDL	227	H<gyro>P<pitch>R<roll><cr><lf> Note: roll is positive port down and pitch positive bow down. Roll & pitch 1/100 degree.
NASNetR RP	230	$NASCRD,<time>,CR4,PR,+,<pitch>,+,<roll>*2B
Nautronix RS9** <Motion>	205	"…P:<Pitch> … R:<Roll>…<CR><LF>"
NaviPac (remote)	220	Calculated instrument based on input from remote NaviPac.
PHINS/ROVINS RPH	238	$PIXSE, HSATIT (done via special PHINS IF module)
Plough RP ($SMD)	231	$SMD,Pitch,Roll,Heading,Tow Force,Burial Depth,Tension,Port Skid Height,Stbd Skid Height, Share Angle, Water Depth, Cable Dist, Steer Angle<CR><LF>
Posidonia	218	$PCVMB,<frame>,<time>,<dd>,<mm>,<yyyy>,000,<roll>,<pitch>,<gyro>,<0D><0A> or $PTSAZ,#NNNNN,HHMMSS.SSS,JJ,MM,AAAA,#PTSAW,R,C.CCC,R.RRR,T.TTT,L.LLLL,L.LLLL,X.XXX,Y.YYY,Z.ZZZ,
POSMV RPH 102/3	226	Motion data from POSMV – network telegram (Group 102).
PRDID: R/P	232	$PRDID,Pitch,Roll,Heading<cr><lf>
ROV Solo <Motion>	208	" …P<Pitch>…R<Roll>….<CR><LF>"
ScanFish III RP	239	$SF,Fish,<gyro>,<roll>,<pitch>,<depth>,<altitude>
SCV ROV <Motion>	207	"….PI<pitch> … RO<roll>…<CR><LF" or "….P:<pitch> … R:<roll>…<CR><LF" or "….P<pitch> … R<roll>…<CR><LF"
Seapath RPH	200	Binary EM3000/1000 compatible or Seapath NMEA format: <Head[2]><Roll[2]><Pitch[2]><Heave[2]><Heading[2]>, where Head equals 90H, 90H (EM3000) or 0H, 90H (EM1000). $PSXN,23,roll,pitch,head,heave*csum <cr><lf> Selection of format must be performed in instrument setup.
Seatex MRU 5/6	203	"q<length><type><RRRR><PPPP><HHHH>C" q is ASCII and the rest is binary coded. RRRR and PPPP are given in radians and HHHH in metres. As default, roll is read from byte number 3, pitch from number 7 and heave from number 11. If needed, this can be changed in the INI file, where MRUrollIndex defines where to find roll, etc.
Sonardyne APS3	219	Calculated instrument based on input from Sonardyne APS-3.
Topcon RTK pitch	225	Topcon-specific $PTPSR,ATT message. Can also be switched over to roll sensor.

Triton XL ROV R/P	213	“$PPTIROV,<gyro>,<depth>,<altitude>,<pitch>,<roll>,<CP1>,<CP2>,<Tel>, <note><cr><lf>”
Triaxus RP	237	DV#xxx.xx,A1#xx.xx, PV#xx.xx, RV#00.00, CL#00.00, CS#00.00+CR + LF
TSS332	276	“<Roll>, <Pitch> <CR>”
TSS DMS05/TSS 335	278	":aaaaaasnhhhhqnrrrrrsnpppp<cr><lf>"
User defined Motion 1	297	Any ASCII string with either byte count or separators.
User defined Motion 2	298	
User defined Motion 3	299	

2.4 Doppler log

Instrument	EIVA ID	Format
Consilium SAL	362	"$VDVBW, <speed water x>, <speed water y>, <Valid>, <speed_x>, <speed_y>, <Valid> <CR><LF>” and "$VDDPT,<depth>,00.0<CR><LF>"
RDI Workhorse Navigator DVL	300	Binary PD0, PD3, PD4, PD5 or ASCII PD6 or special Schilling UHDRov format. To change between the formats, please select in driver details.  Note that the definition is saved in NaviPac.INI and will be global for all RDI DVLS.

2.5 Dynamic positioning

Instrument	EIVA ID	Format
AGA/Leica from fixed point	410	Uses ASCII format item 7, 8 and 9.
AGA/Leica from fixed point 2	419	
AGA/Leica from vessel	409	Uses ASCII format item 7, 8 and 9.
Comb. Dynamic pos 1	440	Calculated instrument, which allows multiple transponders/antennas on

Instrument	EIVA ID	Format
Comb. Dynamic pos 2	441	same vessel.
Comb. Dynamic pos 3	481	
Comb. Dynamic pos 4	483	
Comb. Dynamic pos 5	485	
Digicourse	406	Binary or ASCII format – please see relevant instrument documentation.
EIVA PipeBundle	420	$NPPIPE,DATA,<LEGACY SONARDYNE STRING>
Fanbeam - remote	407	Positioning remote vessel using Fanbeam or Artemis. Selection between various standard formats.
Fanbeam - remote 2	414	
Generic Cable Counter	401	A general dynamic positioning using cable length. Supports the following formats: Valeport pay-out indicator: “<sign><Distance>M<CR><LF>” – Set empty start string MacArtney MKII “L = ddd,d m <LF>” – Set “L” as start string. Esters PMO 2160: Binary data – Set “<10:16,1,10,0,1,240,0,16,3,4>” as start string to enable binary data and polling. Hengel cable counter (“CNTlll.lll<cr><lf>”) set CNT as start string. $CCAlll.ll<cr><lf> (Capital Signal) – Set $CCA as start string. TCOUNT format “1:<length><cr><lf> - Set 1: as start sting. MacArtney Triaxus: The CL field – Set DV as start string
Generic Cable Counter 2	413	
Golf III Laser	408	<code>RRRRAAAA<code>RRRRAAAA – fixed 18 characters.
Hugin FFI positioning	412	Positioning of Hugin AUV via FFI proprietary NMEA strings: $PFFILLD (position and depth) $PFFIAAV (heading and attitude)
iUSBL	487	USBL on dynamic object – uses Kongsberg NMEA format: “$PSIMSSB,hhmmss.ss,tp,Status,error,coord,orientation,sw,x,y,depth, ... <cr><lf>”
Kongsberg Hain	497	Kongsberg/Simrad APOS system expanded with initial system. “$PSIMSSB,hhmmss.ss,tp,Status,error,coord,orientation,sw,x,y,depth, ... "$PSIMLBP,<time>, ,<Type>,<state>,<coordinates>,<easting>,<northing>,…\r\n" Coordinates must be either U (UTM N/E), E (UTM E/N) or R (Lat/Long) in both cases.
Kongsberg HiPAP/APOS	496	“$PSIMSSB,hhmmss.ss,tp,Status,error,coord,orientation,sw,x,y,depth, ... <cr><lf>” or binary HPR400 format. To switch between ASCII and binary HPR400, you must changes settings in the **Options** menu. If HiPAP is operated in dual mode, then it also reads the “$PSIMSSD, hhmmss.ss, tp, Status, error, Master/slave, x, y ,depth, ... <cr><lf>”
Kongsberg HiPAP/APOS - 2.	486	
Kongsberg HPR300	494	Binary BCD data: < head> <roll[2]> <pitch[2]> <course[2]> <tp_id> <X_R[3]> <Y_B[3]>

Instrument	EIVA ID	Format
Kongsberg HPR 300 - 2.	484	<Z D[3]> <stat> <timeout> < TPs[3]> < TDAngle[2]> < test> <type> <specification> <transducers> <Tdstatus> < KalmanWindow> <checksum> <eot> where <eot> equals 40H
Kongsberg HPR300P	495	"TT X N SSS CCC.C xxx.x yyy.y zzz.z qq.q nnn tt.t aaa.a<cr><lf>"
Kongsberg LBL	402	Up to 16 objects. "$PSIMLBP,<time>,<tp_array>,<Type>,<state>,<coordinates>,<easting>,<northing>,…\r\n" Coordinates must be 'E'.
Leica autotrack 1	403	Laser meter: We use parameter 21 (horizontal angle), 22 (vertical angle) and 31 (slant range).
Leica autotrack 2	404	Laser meter: We use parameter 21 (horizontal angle), 22 (vertical angle) and 31 (slant range).
Leica Disto WH15/30	411	Requires word index (WI) 31 "31 06<distance> \r\n
NASNetR	416	$NASPOS,<time>,<TP: ROV1>,<lat>,N/S,<long>,E/W,<height>*4F
Nautronix RS9 - 2.	482	"<Date> <Time> B:<Target> X:<delta X> Y:<delta Y> D:<depth> … E:<Error code><CR><LF>"
Nautronix RS9** <USBL>	492	
ORE BATS ($POREG)	488	$POREG,TP,HHMMSS.SS,0678,0000,0032,QC,00,00027.34,00.00,175.23,xxxxxx.xx,yyyyyy.yy,zzzzz.zz,,-01.32,-00.52,013,050.3*52 Please note that if used with timesync then both BATS and NaviPac must be synchronised with same time source.
ORE Trackpoint II	491	TP-II:"<target> <time> <heading> <bearing> <range> <X> <Y> <Z> .. <CR><LF>" LTX: "<target> <range> <bearing> <depression angle> …<CR><LF>"
PHINS/ROVINS Position	444	$PIXSE, HSPOS (done via special PHINS IF module)
Plough position ($SMD)	417	$SMD,Pitch,Roll,Heading,Tow Force,Burial Depth,Tension,Port Skid Height,Stbd Skid Height, Share Angle, Water Depth, Cable Dist, Steer Angle<CR><LF>
Posidonia USBL	493	Up to 15 objects. $PTSAX,#NNNNN,hhmmss.sss,jj,mm,aaaa,BB,XXXXXX,YYYYYY,A,PPPP,A,CCCC*ch<CR><LF>
Remote dynamic objects 1	421	Data from external navigation system. Three formats supported: NaviPac: "<stx><Id>,<Easting>,<Northing>, <Gyro><CR><LF>" NaviPac +: "<stx><Id>,<Easting>,<Northing>, <Gyro> …<CR><LF>" WinFrog:"$<Id><Rest of GGA string>$<Id><Rest of HDT string><CR><LF>" Pseudo NMEA: "$<Id>GGA …<CR><LF>" and "$<Id>HDT….<CR><LF>" Stolt Offshore France: "<stx><Id> <Easting> <Northing> <Gyro>
Remote dynamic objects 2	422	
Remote dynamic objects 3	423	

Instrument	EIVA ID	Format
Remote dynamic objects 4	424	<Status><chk><CR><LF>" Exp. NaviPac: <stx><Id>,<east>,<north>,<heading> XX, <depth/height>, <std.dev>,<roll>,<pitch>,<heave>,<altitude>,<age> *<checksum> (To be able to use gyro, motion data and data acquisition, these must be defined as separate calculated instruments (gyro from remote NaviPac, etc)). Apache: $SFPOS,<id>,hhmmss.ss,<east>,<north>,<height>,1,<heading>,T*<chksum> Tracs-TDMA: $PRPS,POSN,sss,y,cc,hhmmss,ddmm.mmmm,N,dddmm.mmmm,E, ?hhhh.h,vvv.v,bbb.b,x,m,d,aa,hh,ss,rrrr *hh <cr><lf> IMCA Position: $__TEL,PH, vessel, hhmmss.ss,Lat,Long,Hgt,Sd,Source, Status, heading<cr><lf> Century Subsea Spar: %0,T@AN\|,$HEHDT …. $1GPGGA … <cr><lf> IxSea GAPS: $PTSAG,NN,hhmmss.sss,jj,mm,aaaa,BBB,DDMM.MMMM,H, DDDMM.MMMM,D,A,MMMM.M,A,MMMM.M*ck
Remote dynamic objects 5	425	
Remote dynamic objects 6	426	
Remote dynamic objects 7	427	
Remote dynamic objects 8	428	
Remote dynamic objects 9	429	
Remote dynamic objects 10	430	
Remote GPS1	498	"$..GGA, time, Latitude, N/S, Longitude, E/W, Quality, # Satellites, HDOP, Antenna Alt., Unit, Geoidal separation, Unit, Age, Diff ID <CR><LF> "
Remote GPS 2	499	
Remote GPS 3	433	
Remote GPS 4	434	
Remote GPS 5	435	
Remote GPS 6	436	
Remote GPS 7	437	
Remote GPS 8	438	
Remote GPS 9	439	
Remote GPS 10	442	
Seatrack Tail Positioning	418	<time>< Buoy ID><Range><Bearing><Altitude><#Sat><dop>….<cr><lf>

Instrument	EIVA ID	Format
Sonardyne LBL Pharos/APS3	400	***Geoconsult*** ="FXT;time,E east, N,north,D depth,A error,H heading,T id" ***Stolt Offshore 1***="FXT;delay,TARGET SINGL TRAK,E east, N north,D depth,A error,H heading" ***Stolt Offshore 2***="FXT;ttttt.tt,m,Eeeeeee.ee,Nnnnnnnn.nn,Ddddd.dd,Axx.xx,Hhhh.h" ***Stolt Offshore 3***="FXT;ttttt.tt,m,Eeeeeee.ee,Nnnnnnnn.nn,Ddddd.dd,Axx.xx,Hhhh.hZaaa.aa,Ppp.p, Rrr.r,Sss.s" ***EIVA/Pharos*** ="FXTNP;ID,HH:MM:SS.ss,LL.LL,Eeeeeeeee.ee,Nnnnnnnnn.nn,Dddddd.dd, Saaa.aa,Maaa.aa,Taaa.aa,Paaa.aa,Hhhh.h<cr><lf>" On reception of ”FXT<cr><lf>” it outputs the following information on the same port: ”FXT;hh:mm:ss,E<easting>,N<northing>,H<heading>,S<std.dev><cr><lf>” Please note that the specific format has to be selected in the instrument setup.
Sonardyne USBL ($PSONUSBL)	489	$PSONUSBL,HHMMSS.ss,TP,C,sxxxx.xx,syyyy.yy,zzzz.zz,sxx.xx,sxx.xx,xxx.xx, xx.x*hhCRLF
Sperre Frame based pos	415	$SPESSS,<delta X>,<delta y>,*hh\r\n
Topcon Total station 1	454	Q<range>m<Vertical angle><Horizontal angle>g...<cr><lf>. Measured from vessel towards target. Angle in gons or degrees.
Topcon Total station 2	455	
Trimble CB460	443	$PTNL,PJK + $HDT – position of reference point and bucket + angle sensor data
Tritech Seaking R/B	405	%M002D012200016IP+rrrrr+bbbbbIP+nnnnn+bbbbb<CR><LF>>
User defined Remote Position	431	ASCII input as lat/long, east/north, range/bearing or dx/dy/dz.
User defined Remote Relative Pos	432	

2.6 Special input

Note: special inputs do not have built-in simulators.

It is not recommended that special ports are shared with other inputs. Time sync ports (ZDA or UTC) must not be shared, and due to the PPS input, we highly recommend that the internal COM ports are used for them.

Instrument	EIVA ID	Format

AIS targets	514	AIS tracking system based on VDM position telegrams such as: !AIVDM,1,1,,,1P0001P01p1SUGvR1;n00@1p000,0*27
From Remote NaviPac - control	507	Dedicated inter-NaviPac protocol, which supports runlines, waypoints and anchor patterns. Please see http://download.eiva.dk/online-training/NaviPac%20Manuals/Appendix/A12_Distributed_NaviPac.pdf for further information.
Generic CMS data to EIVA Cat	510	Special ASCII anchor data string. Defined in NaviPac but handled in EIVA Catenary.
LEM30 Height	508	:DinXXX.XXXX<cr><lf>
Line data from Kongsberg RDN50	513	Old format: "$PRTRC,0,<name>,<number of points><CR><LF>" "$PRWPT,<number>,<Latitude>,<Longitude>,<Turnradius>,<type>,,<CR><LF>" New format: "$PRTNW,H, <name>,<number of points><CR><LF>" "$PRTNW,W, <number>,<Latitude>,<N/S>,<Longitude>,<E/W>,<Turnradius>, <Next leg>, <Speed in next leg>, <Speed in turn-radius>, <Speed Unit>,<CR><LF>"
NMEA targets	503	$RATTM,<id>,<range>,<bearing>,<T/R>,<smg>,<cmg>,<T/R>,<CPA>,<tCPA>,<K/N/S>,<name>,<L/Q/T>,<CR><LF> (M=Metres, N=Nautical miles, K=Kilometres and L=Lost target, Q=Target, T=Tracked target) Or $PAEST,<latitude>,<N/S>,<longitude>,<E/W>,<ID>,<range>,<M//N/K>,<bearing>,T,<L/Q/R/T/U><cr><lf> (M=Metres, N=Nautical miles, K=Kilometres and L=Lost target, Q=Target, R=Radar tracking, T=Tracked target, U=Dead reckoning estimate) Or $PXSPT,<latitude>,<N/S>,<Longitude>,<E/W>,<CMG>,T,<SMG>,K,<state>,<name>,<id><cr><lf>
NMEA Waypoint Location	504	$..WPL,<Lat>,<N/S>,<Long>,<E/W>,ID*hh<CR>LF> The ID must be given identical to Waypoint object number, eg 5041 = WP_1 etc. Or EIVA format: $EIVWP,<Id>,<East>,<North>,<Name><CR><LF>" – Id corresponds to special tug id – 201 = Tug 1 etc.
Offset: Reson Minewarming Sonar	512	No real input. This is a special setup that enables NaviPac to calculate offset position for Reson reference position. Special Reson MCM setup.

Osprey DP Waypoint	501	Binary layout 1: Start 11101011 2-6: Estimated X LSN 0.1 M 7-11: Estimated Y LSB.1 M …. 65-69: X0 Set position 70-74: Y0 set position 97: End 11911100 Data is BCD where each nibble (4 bits) represents a digit.
Raytheon Radar	506	Special binary format. Maximum of 20 targets supported.
SCV ROV	502	"HE<heading>,PI<pitch>,RO<roll>,DE<depth>,AL<altitude><CR><LF>
Sercel Nautilus	515	Special TCP/IP data from Nautilus with streamer depths. Telegram 0x6E.
Steinco data to EIVA Cat	509	<0x02><ASCII Data><0x17><CheckSum> Defined in NaviPac but handled in EIVA Catenary.
Trimble UTC time + PPS	505	"UTC yy.mm.dd hh:mm:ss <fix> <satellites><CR><LF>" See http://download.eiva.dk/online-training/NaviPac%20Manuals/16_Timing%20Principles%20in%20NaviPac.pdf for details on how to use UTC timing. **Note:** If PPS is used, NaviPac will automatically synchronise the PC clock with GPS time.
ZDA time + PPS	500	"$..ZDA,hhmmss.ss,dd,mm,yyyy,z1,z2*hh <CR><LF>" See http://download.eiva.dk/online-training/NaviPac%20Manuals/16_Timing%20Principles%20in%20NaviPac.pdf for details on how to use UTC/ZDA timing. **Note:** If PPS is used, NaviPac will automatically synchronise the PC clock with GPS time.

2.7 Data output

Instrument	EIVA ID	Format
NMEA1	624	On each cycle. User can select one or more of the following formats: $..GGA – Position $..GLL – Position $..GXP – Simple position (does also include $NPGSS with HDOP) $..RMC – Position course and speed $..TLL – Target position (for selectable object) $..VTG – Speed $..HDG – Heading $..APA – Auto-pilot information (DOL, bearing and name). $..XTE – Auto-pilot cross track error $..ZDA – Time and date for synchronisation.
NMEA2	625	
NMEA3	626	
NMEA4	650	
NMEA5	651	
AR:CIS	681	NMEA telegrams {GLL, ZDA, DBT, OSD} – specially designed for Asean Restorer – DBT gives depth from either echo sounder (vessel-mounted) or special plough water depth.
Atlas Deso 20/25 Annotation	630	On new events: “TX <Time> <Event> _____<CR><LF>” “*<CR><LF> “EM0<CR><LF> “*<CR><LF>
Autopilot (Format: EMRI Autopilot)	605/604	Dedicated EMRI format. Sends the strings $PESSA, $PESSD and $PESSX.
Autopilot (Format: Condor Autotrack)	605/607	Generic autopilot special interface made for SS7.
Autopilot (Format: Kongsberg DP)	605/608	Waypoints to external unit – generic autopilot.
Autopilot (Format: EMRI SEM200 Autopilot)	605/609	Dedicated EMRI format. Sends the strings $PESSA, $PESSD and $PESSX.
Autopilot (Format: Sjöfartsverket LowSpeed)	605/606	$NPSJOV,Gyro,East,North,Mode,DOL,dE,dN,WP-E,WP-N<cr><lf>
Balder: Output to Reson	689	Special output from Balder system to Reson. "$BALDER,hhh.hh,G,ttt.tt,G,hhmmss.sss*<chksum><cr><lf>
Bodenseewerk gravity	646	“date time <latitude> <longitude> <event> <file> <heading> <course> <speed> <velocity> <speed> <depth> <trigger> <cr><lf>”
CapJet Output	674	“<kp>,<Easting>,<Northing>,<Segment bearing (true)><cr><lf>“

Coda - long format	669	One every cycle: CODA <easting> <northing> <kp> <dcc> <depth> <alt> <smg> <head line> <fix> <SOS> <delay> <nav time> All fields are separated by a space – the number of digits varies from type to type.
Coda Data	661	One every cycle: <Date> <Time> <Reference position> <Offset position> < Offset SMG> < Offset CMG> < Offset Gyro> <Event> < Offset KP> < Offset DOL> <Depth from USBL> <roll> <pitch> <depth> <altitude><CR><LF> All fields are separated by a space – the number of digits varies from type to type.
Data to ext. nav. system	643	Send navigation (position and heading) for up to ten objects to external navigation system – eg tug boats: NaviPac: "<stx><Id>,<Easting>,<Northing>, <Gyro><CR><LF>" WinFrog:"$G<Id><Rest of GGA string>$H<Id><Rest of HDT string><CR><LF>" Pseudo NMEA: "$<Id>GGA …<CR><LF>" and "$<Id>HDT….<CR><LF>" Exp. NaviPac: <stx><Id>,<east>,<north>,<heading> XX, <depth/height>, <std.dev>,<roll>,<pitch>,<heave>,<altitude>,<age> *<checksum> Apache: $SFPOS,<id>,hhmmss.ss,<east>,<north>,<height>,1,<heading>,T*<chksum> IMCA: $..TEL,PH,<name>,<lat>,<long>,<Hgt>,<Sd>,<source>,<Status>,<heading><cr><lf> NaviPac +: Same as NaviPac but string expanded with copy of GPS status and setup information such as geodesy and CRP location. Sonsub $PSURP: "$PSURP,<id>,<east> , <north>,<depth>,<gyro>,<grid heading>,<pitch>,<roll>,<status>*<chk><cr><lf> Kongsberg PSIMSSB: $PSIMSSB,<time>,B<code>,A,,R,N,M,<lat>,<long>,<depth>,<POS ACC>,,,,*<chk><cr><lf>
Data to Triton ISIS	627	On every cycle: <Date> <Time> <Reference position> <Offset position> <SMG> <CMG> <Gyro> <Event> <KP> <DOL> <Depth from USBL> <CR><LF> Below is the ISIS template that correspond to the above output: **DMYHISxyENVhGO{KP}{DOT}{0}** **DMYHISxyENVhGO{KP}{DOT}X** (if no depth from USBL available)
Data to tug boats	653	Distribute position data and commands to tug boats. Supports the Stolt Offshore France PCTug format. See http://download.eiva.dk/online-training/NaviPac%20Manuals/Appendix/A11_RIG_Move.pdf for further details.

Datasonics ChirpII Data	634	Annotation on new event: E <Date> <Time> <Event> <Position 1> <Position 2> <Gyro> <CMG> <SMG> <CR><LF>
Delph 1 Annotation: T E N Ev	632	On new events: <Time> <Easting> <Northing> <Event number><CR><LF>
DigiSHOT	693	Special ASCII output in relation to distance shooting.
DOF SubSea Pipe Inspect	692	Special ASCII output for pipeline inspection.
Dowty 200 Annotation	641	Start of program: Synchronise time: ”TIM dd:mm:yy hh:mm:ss:<CR>” All events: Event marker: "EVT<CR>" SOL/EOL: "TXT20 Ev: <event> <S/E>OL: <name> <CR>" Event interval: "TXT20 Ev: <event> Kp: <kp><CR>" For **Custom id** 46, NaviPac sends the message: "TXT20 <hh:mm:ss> <kp> <dcc><CR>"
DP Out: Artemis BCD	685	Output of range/bearing to selected waypoint in KA-BCD(.01) format.
Edgetech 260	686	Annotation of Edgetech 260 recorder: ” Form$GPEVT,M,Fix,<event>KP<kp>*<checksum><cr><lf>”
Edgetetch 560	687	Data: Edgetch NMEA telegrams ($GPGGU, $GPZDA, $GPVTG) Annotation: Edgetech $EGEVT
Edgetech Midas Data	648	Output to EdgeTech Midas on each cycle: $GPGXY,<x>,a,<y>,b,<time>*<h><CR><LF> $GPPEE,<a>,<b>,<d>*<h><CR><LF> $GPVTG,,,,,,<sk>,N,<sm>,K*<h><CR><LF> $EGHDG,<Head>,<Dev>,<dS>,<Var>,<vS>*<h><CR><LF> For **Custom id** 5 and 40, it gives EGG 260 data and annotation: On cycle (only **Custom id** 5): “<STX>S<SMG><ETX>” On event: “<STX>EV: <Event> <Time> E=<easting> N=<northing> KP = <kp> <ETX>”
EIVA 3D Display	610	Navigation data in ASCII format to SceneServer.
EIVA Dredging	900	Position of bucket and rectangle of cleared area. Special ASCII telegram for Online3D presentation.
EIVA NaviCat	694	Anchor handling data in ASCII format to SceneServer.

EIVA runline control	649	”$<S/E>, <Long File Name><cr><lf>”, where $S : Start logging message $E : Stop/End logging message Long File Name : Name of actual runline (from HD) ”$PE: PT <proj.type> EN="<ellipsoid>" SMA=<semi major axis> IF=<Inverse flattening> OS=<scale> OL=<original latitude> OP=<original longitude> FE=<false easting> FN=<false northing> FP=<first parallel> SP=<second parallel>UTM=<UTM zone>\r\n” ”$DS: ME=<method> TX=<Tx> TY=<Ty> TZ=<Tz> RX=<Rx> RY=<Ry> RZ=<Rz> PPM=<Scale>\r\n"
ELAC {HDP4060} Data	673	”xxxxxxxxx.xxyyyyyyyyy.yyRRRzz.zccc.c55/KK/kkhh:mm:ssaaaa<cr><lf>” xxxxxxxxx.xx East coordinate yyyyyyyyy.yy North coordinate RRR Reference system zz.z Speed made good in knots ccc.c Course made good in degrees 55 ID (Fixed) KK Heading 100 and 10ths kk Heading degree and 1/10ths hh Time hours mm Time minutes ss Time seconds aaaa Data age in ms Start line $S,<name><data>_<time> <CR><LF> Stop line $E <CR><LF>
ELAC HS 4300 Annotation	666	"$PELATM,<time> <event><easting>< northing> <kp>,*<chksum><cr><lf>”
ELAC HydroStar {XSE Position}	667	Position data in XSE network format – see relevant L-3/ELAC product documentation.
ELAC LAZ 4700 Annotation	602	<u>Start Of Line:</u> ”<T>EV:eeeee TI:hh:mm:ss SOL:<Runline name><LF>” <u>End of Line:</u> ”<T>EV:eeeee TI:hh:mm:ss EOL:<Runline name><LF>” <u>Event:</u> ”<T>EV:eeeee TI:hh:mm:ss<LF>”
ELAC LAZ 4721 Annotation	665	”T<time> <event><easting>< northing> <kp> <lf>”
EMRI $PESSX	676	“$PESSX,<dol>,<l/r>,<brg><cr><lf>“ Is output with user-defined frequency – can be less than cycle time.

EPC 1086 Annotation	637	Annotation of events (user-determined frequency): “SIZ <font> <CR><LF>” // Not always supported “MES EV: <Event> <Easting> <Northing> <Standard deviation> <KP> <CR><LF>” "EVE <CR><LF>"
EPC4800 Annotation	636	Annotation of events (user-determined frequency): On start line: Set Event number: Binary hex: 2A, FD, 33, <evt1>, FD, 34, <evt100>, FF where <evt1> is event ones in hex and <evt100> is event hundreds in hex. On Event: If long format: <0x24>, <0x01>,<Event Easting northing std. dev., KP>,< 0xFF> <0x12> else <0x12> For long format, the message is placed in message 1, and annotation is performed. **Note**: The message is send character by character, and if you have more outputs defined, only short format should be selected.
EPC9800 Annotation	633	Annotation of events (user-determined frequency): C<0x5><0x>Mark: C<Len+17><0x0>Message:1DYY2<100><0><Len><0>”<Date> <Time> <Event> <Easting> <Northing> <Std. Deviation> <KP>”
FFI Kalman prog	644	YYYYMMDD HHMMSS.ss latitude longitude <cr><lf>
Geco TriAcq Data	664	Dedicated binary format 4 – see Geco’s product documentation.
GeoAcoustic	642	Special output (fix/cycle) to GeoAcoustic system.
Geometrics SS Data	635	Header data on each event: <Date> <Time> <Event> <Easting> <Northing> <Std. Deviation> <KP> <CR><LF>
Gyro to NaviScan TEST	670	Information about heading and age of this observation – especially for heading calculated on dual RTK. ” #NBHDT,ggg.gg,T,aaa.aaa,S\r\n"
Heave correction and GPS height	621	“HC<heave bias>, A<age>, GPSH<raw GPS height>dZ<dynamic antenna offset><cr><lf>”
Hugin 2001 Data	663	Summarise NMEA GGA and HiPAP position strings on one port.

Klein 595 Data	601	At each cycle: "<LF>S<sp>VV.V<CR> (Speed in knots)" At Start Of Line: "<LF>E4Event:eeeeeeeeeeTime:<sp><sp><sp>HH.MM.SSDate:<sp><sp><sp><sp><sp><sp>dd.mm.yyyySOL:<name><CR>" At End Of Line: "<LF>E4Event:eeeeeeeeeeTime:<sp><sp><sp>HH.MM.SSDate:<sp><sp><sp><sp><sp><sp>dd.mm.yyyyEOL:<name><CR>" At Event: "<LF>E5Event:eeeeeeeeeeTime:<sp><sp><sp>HH.MM.SSJDJJJ kp:kkk.kkkE:eeeeeeeeeeee.eN:nnnnnnnnnnn.n<CR>"
Kongsberg DP Waypoints	639	(Formerly known as ALBATROSS ADP200) NMEA waypoints in the form: $IIRTE,1,1,C,<name>,<WP-ID's>*<check sum> {Start message} $IIWPL,<lat>,N/S,<long>,E/W,<WP id>*<check sum> {One message per wp.} or (**Custom id** = 998) "$PRTRC,<Track-id>,<name>,<# WP's>\r\n" {Start message} "$PRWPT, <Track-id>,<WP-Id>,<Easting>,<Northing>,0.0,1,,*\r\n" {One message per wp.} (If **Custom id** = 99: Binary BCD position and waypoint data to Albatross)
LL Video Overlay	647	On every cycle: <Date> <Time> E <Easting> N <Northing><CR><LF> KP <KP> DOL <DOL> DPT <Depth from USBL> <CR><LF> The second line is only available for **Custom id** 19.
Log OS-9 Data	659	Dedicated output of OS/9 JetKnife data. Includes raw strings and navigation data. See http://download.eiva.dk/online-training/NaviPac%20Manuals/Various/OS9.pdf for further information.
MAGNUM ROV Navigation	678	" <Ship Y> <Ship X> <ROV Y> <ROV X> <KP> <crosstrack><cr><lf>"
MVP Data	658	Send the following strings at each cycle: * $--ZDA * $--GGA * $--VTG * $--DBS * $--XTE which all are standard NMEA telegrams and $--MKP,<kp>,<easting>,<northing><cr><lf> $--TXT,1,1,<start/stop>,<runline-name>

Nav Settings to NaviScan	672	”$<S/E>, <Long File Name><cr><lf>”, where $S : Start logging message $E : Stop/End logging message Long File Name : Name of actual runline (from HD) ”$PE: PT <proj.type> EN="<ellipsoid>" SMA=<semi major axis> IF=<Inverse flattening> OS=<scale> OL=<original latitude> OP=<original longitude> FE=<false easting> FN=<false northing> FP=<first parallel> SP=<second parallel>UTM=<UTM zone>\r\n” ”$DS: ME=<method> TX=<Tx> TY=<Ty> TZ=<Tz> RX=<Rx> RY=<Ry> RZ=<Rz> PPM=<Scale>\r\n" See Section 4.5 ‘Expanded setup’ in this document for details.
Navigation Data Server	683	$PFFO,MLTPT,<group>,<number>,<Latitude>,<N/S>,<Longitude>,<E/W>, <Symbol>,A<cr><lf>
NaviPac Eventing	696	Special output to eventing module.
NaviPac side boats	603	Dedicated EIVA format: <u>Each update:</u> ”POS:<cr><lf> E0,N0,KP0,E1,N1,E2,N2,E3,N3<cr><lf>” Where E0 - Reference position Easting N0 - Reference position Northing KP0 - Reference position kp-value E1 - Offset position No.1 Easting N1 - Offset position No.1 Northing E2 - Offset position No.2 Easting N2 - Offset position No.2 Northing E3 - Offset position No.3 Easting N3 - Offset position No.3 Northing <u>Distribute runlines:</u> ”RUN:<cr><lf>” ”<No Segments>,<Inverse><cr><lf>” ”R1,R2,R3,R4,R5,R6,R7,R8,R9,R10,R11,R12,R13,R14,R15,R16,R17,R18, R19,R20<cr><lf>” (One for each segment)
NaviPac TGO File	695	Creates ASCII TGO file for each navigation cycle.
Odom Annotation	645	“0x010x06E:<event>T:<hh:mm:ss>D:<dd.mm.yy> E:<easting>N:<northing>Kp:<kp>0x04
Outland Video Overlay	677	Special Outland video overlay – with special control GUI.
PHINS/ROVINS Aiding	901	Position aiding as either GGA (on deck) or $PUSBA (in water). Handled via special PHINS driver module.

PLUMS : TMS & Anchor info	684	TMS and anchor information. Special TMS output to Caesar system (Stolt Offshore – LB-200). $Identifier,R1,R2,R3,R4,R5,R6,R7<CR><LF> Where Identifier is shown in the list below: R1 = Null field R2 = Easting of position R3 = Northing of position R4 = Null field R5 = Heading for barge telegram and Null field for Anchor and TDP telegrams R6 = Null field R7 = KP for barge telegram and Null field for Anchor and TDP telegrams Identifier for Barge = 301 Identifier for TDP = 305 Identifier for Anchor 1 = 401 Identifier for Anchor 2 = 402 etc
Position (Exp.) to NaviScan	671	$EivaObject,Time,Age,Easting,Northing,ZValue,Kp,Dcc,Qc,Id\r\n where 'EivaObject' is the name of the selected offset.
Position to ArcScene	679	"Vessel_ID, DATE_TIME, Easting, Northing, UTMZone, Depth, Heading<cr><lf>"
Position to NaviScan	622	"E nnnnnn hh:mm:s.ss EEEEEEEE.EE NNNNNNNN.NN A.AAA aaaaaa.aa ooo.oo kkkk.kkk R xxxxxxxx ccc.cc MC m.mmm<CR><LF>" A.AAA gives the age of current position. ccc.cc gives filtered bias in primary gyro compared to RTK-based gyro or online speed error correction. m.mmm gives the current meridian convergence.
Promaster Data	654	Special interactive protocol via PDPC.EXE: From PM: "<stx><Mean truster angle>*<cs><cr><lf>" To PM: "<STX><Current strength>,<Current direction>,<Vel X>,<Vel Y>,<Tool heading>,<Req. tool heading>,<tool E>,<tool N>,<vessel E>,<vessel N>,<Mean error>,<Normal to mean error> *<cs><cr><lf>"
RDI Current Profiler	631	On each cycle: "$PRDID,<Pitch>,<Roll>,<Heading>\r",
Remote NaviPac - Control	656	Dedicated inter-NaviPac protocol, which allows distribution of runlines and runline control. See http://download.eiva.dk/online-training/NaviPac%20Manuals/Appendix/A12_Distributed_NaviPac.pdf for further information.
Rob track {$DNRTR}	657	$DNRTR,<direction>,<XTE>,<velocity along track>, <velocity across track>, <track offset>, <max turnrate>*<checksum><cr><lf>
ROTS II Data	662	Copy of data from ROTS II (Data acquisition) plus time, position and kp.
ROV Steering (Sperre)	680	$EIVATC,<heading>,<code>,<speed>,<code>,<offtrack>,<speederr>,<regulation>*hh<cr><lf>

RTK Height to NaviScan	623	"@DDDD.DDD A00.00<CR><LF>" Gives difference between heave and RTK height – designed for NaviScan bathy.
Runlines to ECDIS	682	Runline as waypoints using $PFFO,MLWPL and $IIRTE
Schilling Autofollow	691	"$NAVIPAC,<dol>,<L/R>,M<Bearing>,<pos flag>"
SCS ROV Head Up	629	Special Stolt Comex Seaway format. On each cycle: <Date> <Time> <Dive number> <Heading> <Easting> <Northing> <Std. Deviation> <KP> +000.00 <Bathy> <Depth> <Bathy + Depth> <Pitch> <Roll> <CP> 00.00 @<CR><LF>
SCS ROV Log2	638	Special Stolt Comex Seaway format. On each cycle: "<date>,<time>,<easting>,<northing>,<kp>,<dol>,<heading>,<USBL-x>,<USBL-y>,<USBL-z>,<convergence>,<std.dev>,<dive number><cr><lf>" For **Custom id** 6 (Geoconsult), it gives a dedicated QA output: "date, time, time1, E1, N1, E2, N2, dE, dN, HDOP1, HDOP2, #SAT1, #SAT2, SMG, KP, DOL<cr><lf>"
Seismic Navigation Header	699	Spectra: $1<length><revision><status><shottime>UTC<event><line><lat><long><depth><source-lat><source-long><gyro><CMG><SMG>000<east><north><dE><dN> <brg><jd> <cr><lf> ION: $1<length><revision><status><shottime>UTC<event><line><lat><long><depth><source-lat><source-long><gyro><CMG><SMG><FFID><Shots to go><line type> <last FFID><line seq> <brg><extra> <cr><lf>
Serial data out: E,N,Z,T,Ev,G,H	628	Special serial output on each cycle: Normal: E=<Easting> N= <Northing> H=<Height> Ev=<Event> G=<Gyro> D=<Depth><CR><LF> **Custom id** 2: E=<Easting> N= <Northing> Z=<Height> T=<Time> Ev=<Event> G=<Vessel Gyro> H=<Offset heading> KP = <KP> D = <Depth><CR><LF>
Simrad MBE 710 SOL/EOL	688	Start and stop lines using special $NPR12 and $NPR10 messages.
SMK runline control	675	Start logging: „$Syymmddhhmmss_line-name<cr><lf>" End logging: „$E<cr><lf>" Cycle: „<east><north>UTM32-EUREF <SMG><CMG><Gyro><yymmddhhmmss><latency> <cr><lf>" Only for **Custom id** different from zero.
Sonardyne DEP & VEL	698	$PSONDEP,<depth>,,M,*<chksum><cr><lf> and $PSONSS,<depth>,<sound-velocity>,M, *<chksum><cr><lf>
Steering info to HRP	690	Combination runline tracking via NMEA $NPAPB and waypoint list via NMEA $NPRTE and $NPWPL messages.

Subsea7 $ACGDAT	697	$ACGDAT,ID,PID,time,east,north,height,gyro,roll,pitch,bathy,age,quality,time-depth,depth, timedaq1, daq1,timedaq2,daq2*<chksum><cr><lf>
Syntrak 480 Rec.	655	“Date/Time Ev: <event> E:<east> N:<north>D:<depth> “Gy:<gyro> SMG:<smg> CMG:<cmg> CVG:<convergence><cr><lf>”
TMS to CMS	660	In Rig Move mode – special anchor/tug output to external CMS. See http://download.eiva.dk/online-training/NaviPac%20Manuals/Appendix/A11_RIG_Move.pdf for further information.
Trackpoint II – Depth to	668	Depth information to the USBL system to improve X/Y calculation: ”DEP <depth><CR><LF>”
User defined output 1	611	Free ASCII output. See http://download.eiva.dk/online-training/NaviPac%20Manuals/Appendix/A1_User%20defined%20Outputs.pdf for further details.
User defined output 2	612	
User defined output 3	613	
User defined output 4	614	
User defined output 5	615	
User defined output 6	616	
User defined output 7	617	
User defined output 8	618	
User defined output 9	619	
User defined output 10	620	
Waverly 3700 Annotation	640	Start of program: Synchronise time: ”TIM dd:mm:yy hh:mm:ss:<CR>” All events: Event marker: "EVT<CR>" SOL/EOL: "TXT20 Ev: <event> <S/E>OL: <name> <CR>" Event interval: "TXT20 Ev: <event> Kp: <kp><CR>" For **Custom id** 46, NaviPac sends the message: "TXT20 <hh:mm:ss> <kp> <dcc><CR>"
Waypoint control	652	Distribute waypoints to external navigation systems (if waypoint attached to an objects) – for use, see http://download.eiva.dk/online-training/NaviPac%20Manuals/Appendix/A11_RIG_Move.pdf. $EIVWP,<Id>,<East>,<North>,<Name><CR><LF>” – Id is generated by the system, as it uses 200 + remote id, where remote id is the identification number given for an remote input. To allow exportation of barge/rig position, it will also output a single NaviPac string with the reference position: “<stx>99,<Easting>,<Northing>, <Gyro><CR><LF>” – this can be used to display rig/barge position on remote systems.

2.8 Data acquisition

Instrument	EIVA ID	Format
ADCP Depth(s)	746	Select up to three ranges from the binary PD0 format (four beams).
AMT Dissolved Oxygen	798	Interfaced via AD Converter to simple ASCII string. NaviPac stores raw voltage, oxygen percentage and concentration.
AMT PH	799	Interfaced via AD Converter to simple ASCII string. NaviPac stores raw voltage and calculated PH.
AR CIN Port	755	$PABBCIN,P-spd,S-Spd,P-count,S-count,P-tension,S-tension 755: Port side data 756: Starboard side data
AR CIN Stbd	756	
AR PL: Depth	753	$PATLPLO,pitch,roll,heading,port skid,stb skid,trench dpt,burial dpt,water depth,force,tension 752: Port skid, starboard skid 753: Trench depth, burial depth, water depth 754: Force, tension Note: PATLPLO and PABBCIN strings comes on the same input – but have to be split on two physical ports in NaviPac.
AR PL: Force	754	
AR PL: Skid	752	
Atlas Deso 25	700	DA<Depth> <CR><LF> or DB<Depth> <CR><LF>
Benthos PSA 900	729	"Ddd.dd Ttt.tt Rrr.rr\r\n"
BenthosSIS1000	740	Depth, CTD and magnetometer information from the SIS1000 telemetry output. " Range, Depth, Altitude, SV, Mag nT, Mag Signal, Temp, Conductivity<CR><LF>". The range will be used for online coverage display on the HD.
Benthos SIS1000 (CTD)	741	
CapJet In 1	744	"<gyro>,<pitch>,<roll>,<sword left>,<sword right>,<hor. Dist>,<speed1>,<speed2><cr><lf>"
CapJet In 2	745	"<gyro>,<pitch>,<roll>,<sword left>,<sword right>,<hor. Dist>,<speed1>,<speed2><cr><lf>"
Carousel data	772	XXX,Distance,m/Hr,m/s,Tension<CR><LF>
Caterpillar Data (JD)	793	$CAPIASH,moment,tension,length,diameter,status,alarm,alarm,temp1,temp2,temp3,temp4,ttemp1,ttemp2,speed,pressure*chk<cr><lf>
Corrocean CP	720	"<G{gradient} R{CP} S{Stab tip} M N><cr><lf>" - or is it <lf><cr> ?
CTC Trencher <Depth>	715	CTC (SCS) Trencher information.
CYCLOPS-7 (ScanFish)	797	Interfaced via AD Converter to simple ASCII string. NaviPac stores raw voltage and scaled data.
DGH 2611 Pulse counter	730	"pppppp<cr><lf>" Pulse corresponds to speed in nautical miles (1 NM = 20,000)

Digicourse Feather Angle	733	Special calculated instrument based on Digicourse and Remote GPS. Channel 1: Feather angle based on Digicourse Channel 2: Average streamer angle based on Digicourse Channel 3: Feather angle based on Remote GPS
Digiquartz Barometer	778	"*ccccPPP.PPPP<CR><LF>". The incoming pressure must be in millibar.
Digiquartz Depth	704	"*ccccPPP.PPPP<CR><LF>" NaviPac will give both pressure and depth as two separate channels. **Note**: The incoming pressure must be in PSI.
Digiquartz Depth (Compensated)	779	NaviPac will give both pressure and depth as two separate channels – this will be compensated for barometer reading if present. **Note**: The incoming pressure must be in PSI.
Dillon EDxtreme	776	FORMAT4:llllll.l, lbf,pppppp.p, lbf<cr>
Distance shoot info	763	Special calculated driver for statistics on distance shooting: 1: Distance between events 2: Time to next event 3: Time between last two events
Eilersen Tension	788	<#>:<id1>,<tension count1>,....<cr><lf>
ELAC HS4300	738	"$PELACSDS,<location>,<depth>,…<cr><lf>" – NaviPac supports Location S (channel 1), P (2) and B (3).
ELAC LAZ 4700	707	"DDDD<unit><cr><lf>" Where <unit> is m, dm or cm
ELAC LAZ 4721	737	"<lf>xDDDDDDW<cr>", where D gives depth in centimetres.
Fahrentholz	790	ddddd,ddddd<cr><lf>
Fjordkabel I/F	759	"Cable tension, -cable length, cable speed<cr><lf>"
Free Acquisition	855	Reads up to 20 items from ASCII string (byte count, comma, space, colon, semicolon or tab separated).
GSSI Georadar	722	<STX>#<Scan number><ETX> The instrument is polled once each cycle by sending a '#' to the unit.
HiPAP Travel Time	768	$PSIMSSB,hhmmss.ss,tp,Status,error,coord,orientation,sw,x,y,depth, ... <travel time><cr><lf>
HydroC CO2	794	Special 10-byte binary starting with '#'. Measures CO_2.
Innovator 3	747	"$PSSI,H ggg.g,P pp.p,R rr.r,D ddd.d,A aa.a*<chksum>
Innovatum Tracker	758	Selectable eight parameters from 64- og 80-character Innovatum string.
iUSBL QC	787	Special calculated item for iUSBL streamer integration. a) Streamer pitch b) Stream yaw c) Streamer length
JD Angle Measurement	792	$ANGLE, count<cr>><lf>

LDM 41/42	775	<distance><cr><lf>
Leg Penetration	791	$NPLEG,L1-H,L1-P, L2-H,L2-P, L3-H,L3-P, L4-H,L4-P<cr><lf>
MAG G-866	726	" $ 0 ddd hhmmss 0 nnnnnn<cr><lf>" where nnnnnn gives the raw reading. Channel 1: Raw reading C1 Channel 2: Processed value: C2 = C1[now] – C1[history] Channel 3: Normalised value: C3 = (1-gain)*C1[now]+gain*C3[now-1]
MAG G-880	708	"$<mag>, <AD Channel>, <Depth>, <Altitude><CR><LF>" For the raw instrument (708), we have magnetometer as channel 1, AD Channel number 2, and altitude channel 3. Depth will be stored as local bathy. For the processed magnetometer (723), we have the magnetometer as channel 1, difference between actual reading and old reading (samples) as channel 2, and difference between actual reading and a running average (defined via gain) as channel 3.
MAG G-880 Procesed	723	
MAGNUM ROV Data	748	" : aa.aa ddd.dd gggg rrrrrr pppppp<cr><lf>
Mesotech scanner	721	"<L/R> <Angle>, <Range><CR><LF>" Uses a global defined sound velocity.
MiniCon 30	857	Calculated sword depth based on angle. @WMNfffffffffsssaaaaaaaaaaaaaaaaaaaaaaaaqqqrrtttooooooooovvcc*<CR>
NASNetR Daq	766	$NASCRD,165804.84,CR4,P,-0.19*6B $NASCRD,165804.94,CR4,D,-1.90*7E $NASCRD,165820.73,CR4,T,17.4*46
NaviPac (remote)	734	Calculated instrument based on Remote NaviPac – expanded format. One data acquisition channel.
NaviSound 2000	702	"*..<Q1><Depth1><Q2><Depth2><Q3><Depth3><CR><LF>
NMEA 183 Depth	703	$..DBT,,<Depth>… <CR><LF> or $..DBS,,<Depth>… <CR><LF> or $..DPT,<Depth>…. <CR><LF>
NMEA Speed	739	$..VTG, $..VHW and $..VBW standard NMEA format.
NMEA Wind Sensor (MWV)	757	$..MWV,<dir>,<ref>,<spd>,<uni>,<sta>,*<chk>,<cr><,lf> 767: Processed.
NMEA Wind (MWV) Processed	767	
Octans data frame	731	$..HRP, <number of turns>,<xxx>\r\n"
Odim Winch Control	786	"PLCWNE<Time><Length><Tension> ..." Only first data set read by NaviPac.

Odom EchoTrac	709	" <Resolution> <Depth><CR>" or " <Resolution> <Freq> <Depth><CR>" or " <Resolution> <B> <Depth1> <Depth2>" We do not support feet – only metric. High frequency will always be channel 1 and low frequency channel 2.
OS-9 (remote)	735	User-selectable three channels from 12 strings. See http://download.eiva.dk/online-training/NaviPac%20Manuals/Various/OS9.pdf.
Plough as laid ($SMD)	769	$SMD,Pitch,Roll,Heading,Tow Force,Burial Depth,Tension,Port Skid Height,Stbd Skid Height, Share Angle, Water Depth, Cable Dist, Steer Angle<CR><LF>
Plough data ($SMD)	771	
Plough variables ($SMD)	770	
PS 30	856	Bathy depth and pressure. S<Mantisse>E<Exponent>T<Temp><cr><lf>
RDI Current	728	Binary RDI PD0 format.
Reson Deso Exp.	749	DA<Depth> <CR><LF> DB<Depth> <CR><LF> and optional SD<sv><dr1><dr2><cr><lf>
ROTS I	727	Dedicated ROTS format from Geoconsult – see http://download.eiva.dk/online-training/NaviPac%20Manuals/Various/ROTSII.pdf.
ROTS II	736	User-selectable three parameters from up to six ids ("$id<val>@").
ROV Solo <Depth>	716	" …D<Depth>…A<Altitude>….<CR><LF>"
SAIV204 {DSS}	762	"N<id> C<cond> T<temp> P<pres> c<sv> S<salinity><cr><,lf>"
SAIV204 {PTC}	761	
SBE49 CTD	795	Uses Output Format 3 – engineering units and format 0 raw HEX: TT.TTTT, CC.CCCC, PPPP.PP,SS.SSSS,VVVV.VVVV<cr><lf>
SBE49 CTD2	796	
ScanFish Data	760	ScanFish II. User-selectable fields in comma-separated string.
ScanFish III Data	863	ScanFish III. $SF,Fish,<gyro>,<roll>,<pitch>,<depth>,<altitude>
SCV ROV <Depth>	714	"…DE<depth> AL<Altitude>…<CR><LF>" or "…D:<depth> A:<Altitude>…<CR><LF>" or "…D<depth> A<Altitude>…<CR><LF>"
SeaBird Pressure	785	#<temp>,<pressure>,<date>,<time><cr><lf> or <LF><tab>TTT.TTTT,CC.CCCCC,PPPP.PPP,SSSS.SSSS,VVVVV.VVV<CR>

SeaMaster Trawl Data	789	$LD,<len1>,m,<len2>,m,<ten1>,k,<ten2>,k,<cr><lf>
Simrad EA200	717	“D<Depth>”
Simrad EA300P	701	“ <Depth><CR><LF>“
Simrad EA500	713	“D<channel>,<Time>,<Depth>,<Strength>,<Transducer>,<Slope>CR><CR><LF>”
Simrad UK 90/94	705	“ …. Dddd.dd … Aaaa.aa… <CR><LF>” depth and altitude in metres.
Sonardyne APS3	732	Calculated instrument based on APS3 input – altitude & salinity.
Special A/D Converter	742	Voltage information from A/D Converter box (ICP DAS I-7012 or similar). Polled by “#01<cr>” answer “><channel 1><channel 2>…<cr>”
Standard 20	743	Binary std. 20 format: <stx><gyro><chg><mc1><mc2><rot><status><compass><chk><eot>
Steinco AMS	765	Special Steinco format. "<0x02><ASCII Data><0x17><CheckSum>"
Subspection CP	719	”CP<cp><cr><lf>”
Triaxus Data	850	DV#xxx.xx,A1#xx.xx, PV#xx.xx, RV#00.00, CL#00.00, CS#00.00+CR + LF
Tritech Altimeter	784	[B]aaa.aaa<cr><lf>
Tritech SCU3 bathy	718	Bathymetric system reply data in continuous ASCII format: WINSON processed or raw. Please note that the two formats refer to different offsets, and you have to select them carefully in combination with the offsets entered in NaviPac. “%D<Header><Data><CR><LF>” 718: Altimeter, SV, Depth 764: Salinity, Temperature, Conductivity
Tritech SCU3 STC	764	
Triton XL ROV D/A	725	“$PPTIROV,<gyro>,<depth>,<altitude>,<pitch>,<roll>,<CP1>,<CP2>,<Tel>,<note><cr><lf>”
TSS 340/350	750	":TQaaaa bbb ccc ddd11111122222233333344444 4 XX\r\n" or ":SQsLLLL VVVV AAAAsCCCCsSSSs1111s2222s3333s4444s5555s6666 qq\r\n" 750: dX,dZ,DOB 751: Average strength, S1, S2 The average signal strength is calculated as the average value of the two lateral and the two vertical signals. The values are in millivolts.
TSS 340/350 (signal str)	751	
Turner C6 - CYCLOPS-7	851	Free ASCII interpreter (date time val1 ... val 6)
Ulvertech bathy	706	“ddddd,aaaa<CR><LF>” depth and altitude in centimetres.
User defined input 1	710	Any <CR><LF> ended string with up to three items.
User defined input 2	711	
User defined input 3	712	
User defined input 4	773	
User defined input 5	774	

User defined input 6	858	
User defined input 7	859	
User defined input 8	860	
User defined input 9	861	
User defined input 10	862	
Valeport Current Meter	853	"<speed X><tab><speedy><cr><lf> NaviPac supports metres per second, knots and millimetres per second. 853 gives raw measurements and 854 absolute measurements by combining with vehicle data.
Valeport Current Meter Process	854	
Valeport Proc 1	780	(Proc 1 and Proc 2) "Date Time Conductivity Pressure Temperature Altimeter SV Measured SV Calculated Depth Total Depth Point Density Density Profile Salinity Barometric Pressure IPS 1 IPS 2 IPS 3 IPS 4 IPS 1 Depth IPS 2 Depth IPS 3 Depth IPS 4 Depth <CR><LF>
Valeport Proc 2	781	
Valeport Raw 1	782	Sound speed<tab> Pressure<tab>Temperature<tab>depth<tab> Conductivity
Valeport Raw 2	783	
WETLabs FLNTU	777	Supports firmware versions 3.01 or higher. <data> <time> < λ1> <CHL> <λ2> <NTU> <Thermistor> User enters scale and dark count.
Aanderaa 4330	852	Free ASCII interpreter (val1 ... val xx)
Aanderaa surface pressure	724	Support up to three channels based on various strings of the type "<id> <name> <value> <unit><cr><lf>". Sample: 01 Water level 4.32 cm 02 Water temp. 11.12 Deg.C 03 Air pressure 1015.69 hPa

3 Special interfaces

This section describes some very special instruments handled in NaviPac.

3.1 LEM30 Height

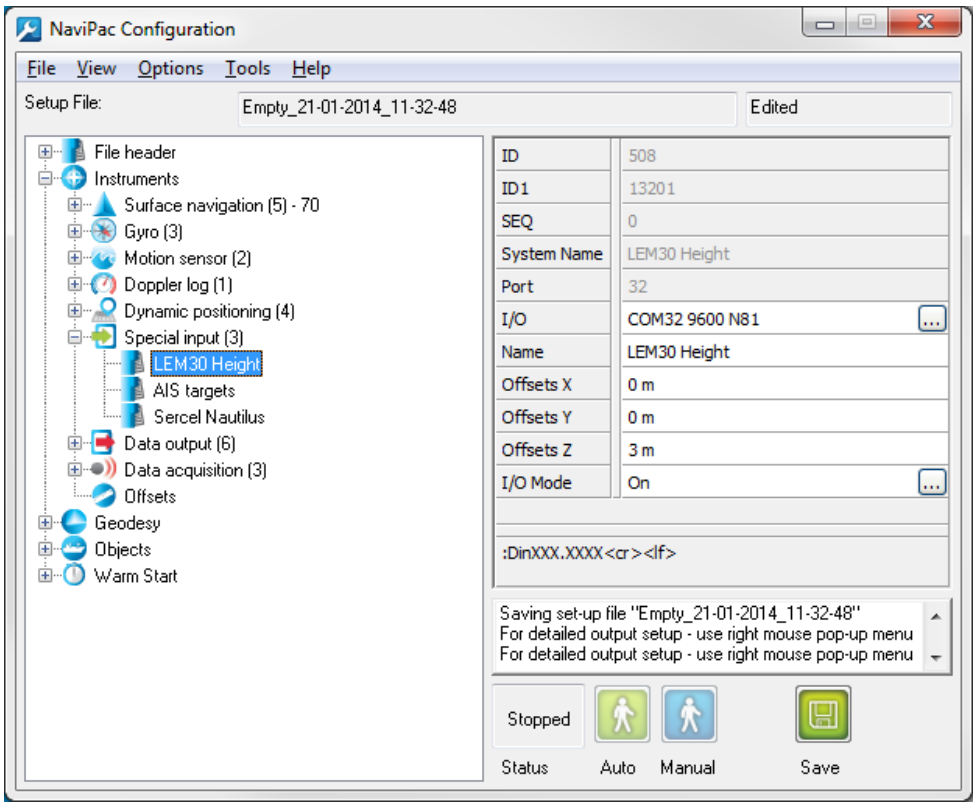


Figure 1 NaviPac Configuration selection of LEM30 Height setup

On some vessels, the antenna(s) can be moved up and down to enable travel under bridges, etc.

To be able to perform optimal navigation while the antenna is away from default position, we have added an LEM30 laser distance meter.

This instrument must be placed so it measures the distance from a given point to the antenna either on request or continuously. Initially, the user must enter the default value as **Offsets Z** (could be found by installing the instrument and making a measurement). NaviPac will then at each update find a delta height based on the entered **Offsets Z** value and the measured value. This delta value is subtracted from all antenna offsets. At each change, NaviPac generates an alarm.

3.2 Dual HiPAP

NaviPac versions 3.3L and onwards offer the possibility to use the Kongsberg HiPAP (HPR400 NMEA Sentence) in both ordinary and dual mode.

The ordinary mode uses the standard $PSIMSSB strings, and the dual mode uses $PSIMSSD strings.

To avoid changing the transponder principle in NaviPac, we have decided to assign codes between 101 and 199 to master transponder data and 201 to 299 to slave transponder data.

The codes will not be visible to the user, as the selection displays it as:

- Normal: The combined position from SSB telegram
- Master: Master position from SSD telegram
- Slave: Slave position from SSD telegram

The entered **TP Code** must always be between 1 and 99.

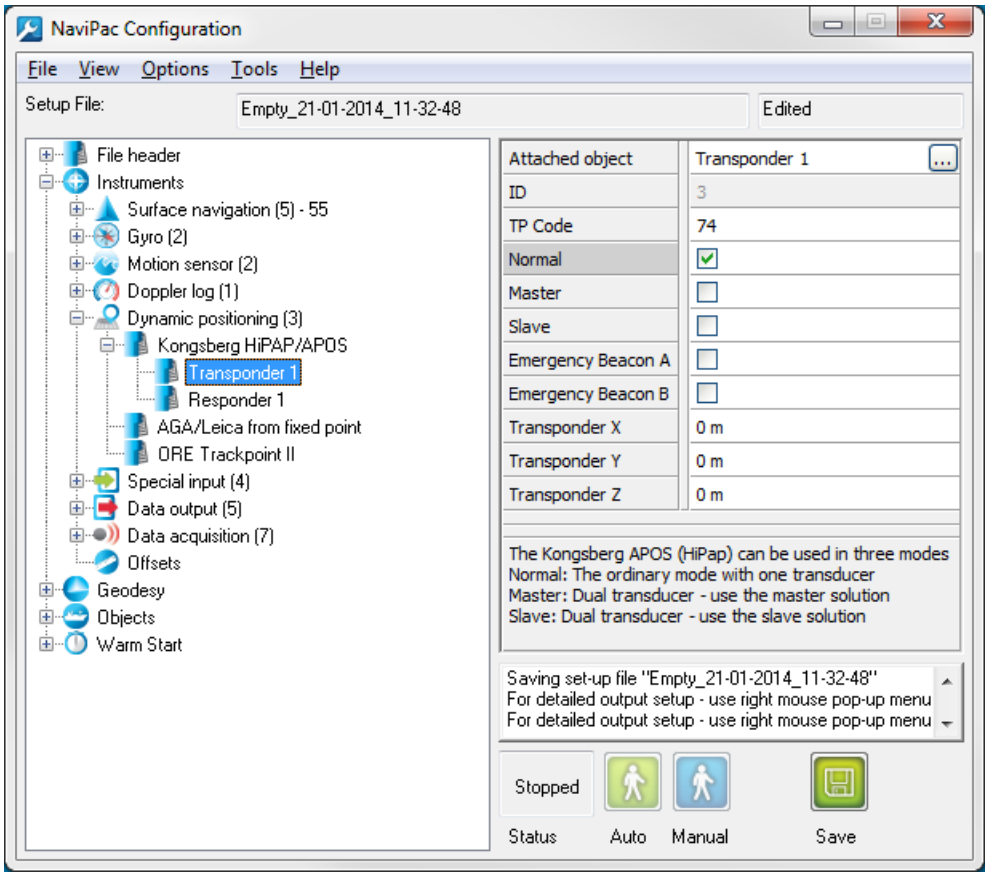
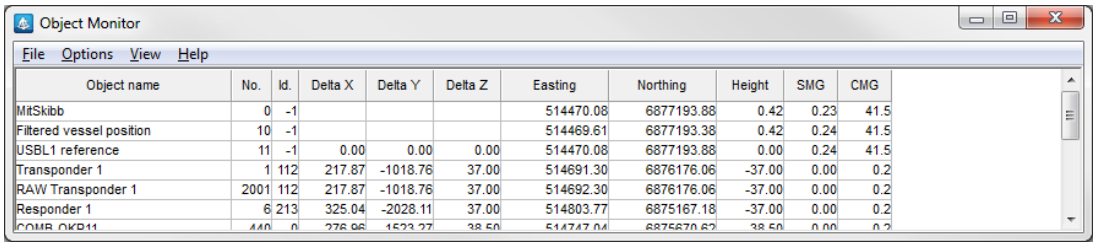


Figure 2 HiPAP transponder setup

But in online displays, the modified codes are visible:



Object name	No.	Id.	Delta X	Delta Y	Delta Z	Easting	Northing	Height	SMG	CMG
MitSkibb	0	-1				514470.08	6877193.88	0.42	0.23	41.5
Filtered vessel position	10	-1				514469.61	6877193.38	0.42	0.24	41.5
USBL1 reference	11	-1	0.00	0.00	0.00	514470.08	6877193.88	0.00	0.24	41.5
Transponder 1	1	112	217.87	-1018.76	37.00	514691.30	6876176.06	-37.00	0.00	0.2
RAW Transponder 1	2001	112	217.87	-1018.76	37.00	514692.30	6876176.06	-37.00	0.00	0.2
Responder 1	6	213	325.04	-2028.11	37.00	514803.77	6875167.18	-37.00	0.00	0.2
COMB_OKP11	440	0	276.96	1523.27	38.50	514747.04	6875670.62	38.50	0.00	0.2

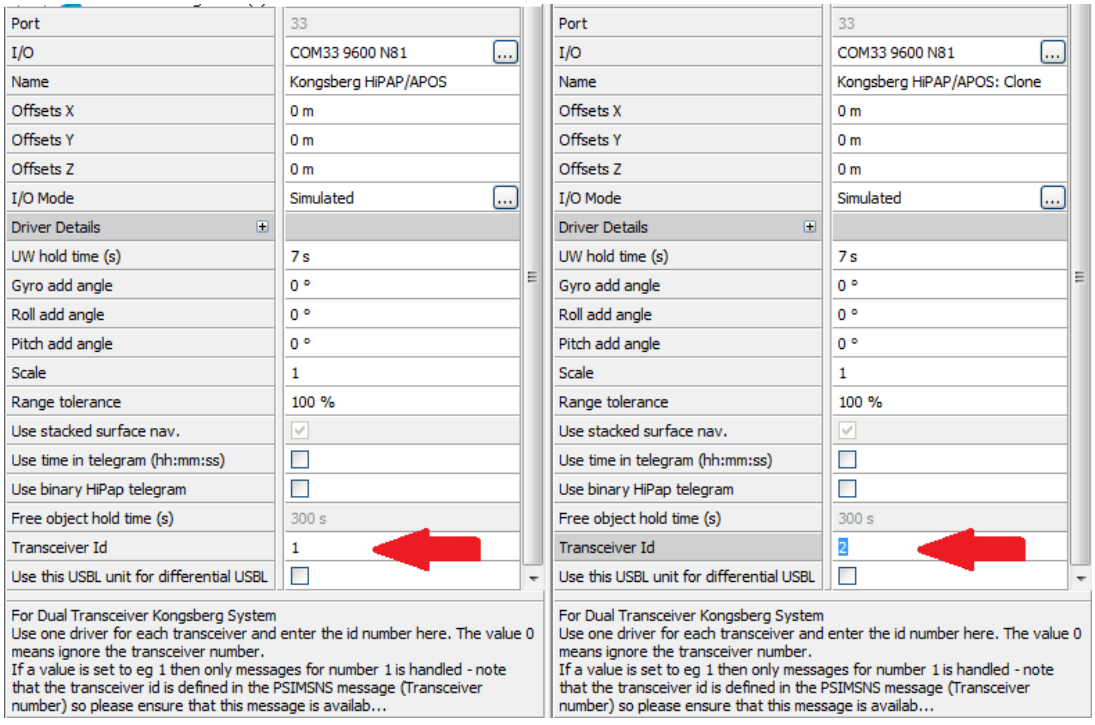
Figure 3 Online display of modified transponder codes

3.3 Dual Transceiver HiPAP

The Kongsberg system can be operated in a dual transceiver mode where each target can be positioned via one or the other transceiver. The output from both transceivers is given on the same interface but has to be used on two drivers in NaviPac.

First of all, make sure that the Kongsberg system outputs both PSIMSSB (the position) and PSIMSNS (attitude, etc), as NaviPac otherwise cannot see the transceiver number.

Both HiPAP drivers have the same instrument setup – the only difference is the **Transceiver Id**:



Port	33
I/O	COM33 9600 N81
Name	Kongsberg HiPAP/APOS
Offsets X	0 m
Offsets Y	0 m
Offsets Z	0 m
I/O Mode	Simulated
Driver Details	
UW hold time (s)	7 s
Gyro add angle	0 °
Roll add angle	0 °
Pitch add angle	0 °
Scale	1
Range tolerance	100 %
Use stacked surface nav.	
Use time in telegram (hh:mm:ss)	
Use binary HiPap telegram	
Free object hold time (s)	300 s
Transceiver Id	1
Use this USBL unit for differential USBL	

For Dual Transceiver Kongsberg System
Use one driver for each transceiver and enter the id number here. The value 0 means ignore the transceiver number.
If a value is set to eg 1 then only messages for number 1 is handled - note that the transceiver id is defined in the PSIMSNS message (Transceiver number) so please ensure that this message is availab...

Port	33
I/O	COM33 9600 N81
Name	Kongsberg HiPAP/APOS: Clone
Offsets X	0 m
Offsets Y	0 m
Offsets Z	0 m
I/O Mode	Simulated
Driver Details	
UW hold time (s)	7 s
Gyro add angle	0 °
Roll add angle	0 °
Pitch add angle	0 °
Scale	1
Range tolerance	100 %
Use stacked surface nav.	
Use time in telegram (hh:mm:ss)	
Use binary HiPap telegram	
Free object hold time (s)	300 s
Transceiver Id	2
Use this USBL unit for differential USBL	

For Dual Transceiver Kongsberg System
Use one driver for each transceiver and enter the id number here. The value 0 means ignore the transceiver number.
If a value is set to eg 1 then only messages for number 1 is handled - note that the transceiver id is defined in the PSIMSNS message (Transceiver number) so please ensure that this message is availab...

Figure 4 Selection of Transceiver Id

Setting up the HiPAP drivers in **NaviPac Configuration** from startup can be done easily by using the clone function:

1. Define the primary driver
2. Set **Transceiver Id** to the first number (eg '1')
3. Add objects
4. Right click on instrument and select **Clone to second Kongsberg system**
5. NaviPac generates a copy of the first driver with new **Transceiver Id** and the same list of objects

If you use the clone function at a later stage, you must individually add objects to the new cloned driver by using all objects on driver 1 as the reference.

In **Online**, you must select from the **Edit > Positioning Systems** menu which of the two transceivers you are using.

3.4 PHINS/ROVINS

NaviPac versions 3.8.4 and onwards include a special driver to the PHINS/ROVINS system.

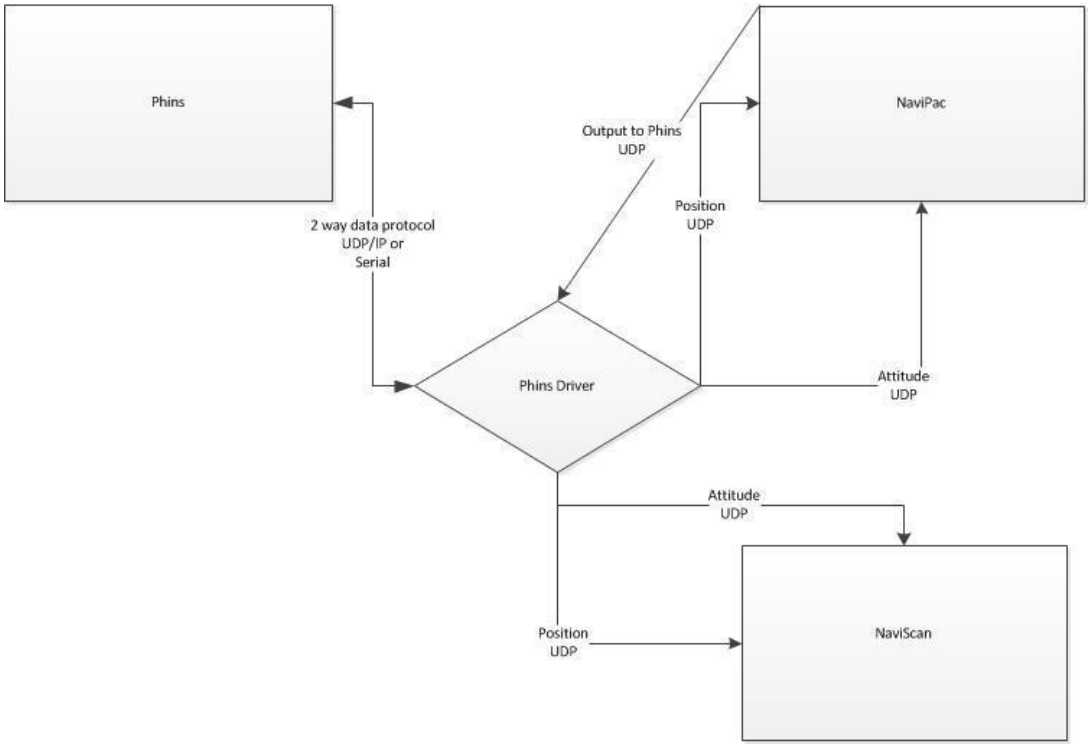


Figure 5 PHINS/ROVINS data flow

The system utilises two-way communication with the PHINS/ROVINS instrument to:

- Feed aiding information into the unit
- Receive position data from the unit
- Receive attitude data from the unit
- Deliver data in time-tagged form to NaviPac and NaviScan
- Send raw position (USBL, LBL or similar) out to the IXSEA system using the IXSEA $PUSBA format
- If the ROV is on deck (or the raw position is missing), send the vessel position to the IXSEA system using NMEA $GPGGA
- Receive position data and attitude data from the PHINS/ROVINS in the Halliburton SAS format ($PIXSE,HSPOS and HSATIT) and pass this on to NaviPac (and optionally NaviScan)
- The PHINS/ROVINS system and NaviPac must be synchronised to the same time source (GPA time)
- The interfacing between PHINS/ROVINS and EIVA must be either serial (COM port) or UDP/IP (networked)

To learn more, please see the EIVA training site: http://download.eiva.com/online-training/NaviPac%20Manuals/Appendix/PhinsOut.pdf

3.5 Nautronix NASNet

NaviPac can interface to the Nautronix underwater system NASNet (to learn more, see http://www.nautronix.com/index.php?option=com_content&task=view&id=83&Itemid=86).

The NASNet system outputs position and data telegrams as described in Sections 3.5.1 ‘Specification from Nautronix’ to 3.5.3 ‘Use in NaviPac’ below.

3.5.1 Specification from Nautronix

NASNet Single String Feeds
There will be two string outputs from NASNet. One will have all the position data and the second will have all the construction receivers’ sensor data. These strings are explained below.

String one: All separations are by means of a comma. Below is an example of how the string will look:

$NASPOS,150536.84,ROV1,5700.001111,N,00159.998616,W,-0.2*4E

- **$NASPOS**: This is the string header.
- **150536.84**: Timestamp of data string in HHMMSS.SS.
- **ROV1**: String identifier. These differentiate as follows:
    - **ROV#** for various ROVs being tracked
    - **CR#** for various Construction Receivers being tracked
    - **BOAT** for Beamformer position
- **5700.001111,N**: Latitude in DDMM.MMMMMM, north or south.
- **00159.998616,W**: Longitude in DDDMM.MMMMMM, east or west.
- **-0.2**: Depth of receiver in metres.
- ***4E**: Checksum followed by carriage return and line feed.

String two: All separations are by means of a comma. There are five readings available from each construction receiver depending on what the user decides. Below are examples of how the string will look:

$NASCRD,170257.53,CR4,T,17.4*4A
$NASCRD,170302.12,CR4,PR,+1.10,+2.00*2A
$NASCRD,170303.63,CR4,H,330.50*52
$NASCRD,170235.66,CR4,P,-0.18*6A
$NASCRD,170235.80,CR4,D,-1.78*71

- **$NASCRD**: This is the string header.
- **170257.53**: Timestamp of data string in HHMMSS.SS.
- **CR4**: String identifier (from 1 up to a maximum of 31).
- **T**: The fourth comma-separated value denotes the type of data as follows:
    - **T**: Temperature in degrees Celsius
    - **PR**: Pitch and roll in degrees (pitch positive is bow up, roll positive is starboard up)
    - **H**: Heading in degrees
    - **P**: Pressure in bar
    - **D**: Depth in metres
- **17.4**: The fifth value is the data value. On the pitch roll string, pitch is listed first, and roll is listed second.
- ***4A** Checksum followed by carriage return and line feed.

3.5.2 Sample from Nautronix

Position
$NASPOS,150536.84,ROV1,5700.001111,N,00159.998616,W,-0.2*4E
$NASPOS,150536.97,CR5,5700.024037,N,00159.976487,W,-0.2*1A
$NASPOS,150542.29,ROV2,5659.999996,N,00159.999137,W,-0.5*49
$NASPOS,150544.55,BOAT,5700.000143,N,00159.998933,W,-0.2*2B
$NASPOS,150544.55,ROV2,5659.999977,N,00159.999152,W,-0.5*48
$NASPOS,150545.73,BOAT,5700.000213,N,00159.998954,W,-0.2*29
$NASPOS,150546.60,BOAT,5700.000167,N,00159.998895,W,-0.2*24
$NASPOS,150546.61,ROV2,5700.000494,N,00159.999525,W,-0.5*4D

Sensor
$NASCRD,165645.59,CR4,H,330.50*58
$NASCRD,165650.11,CR4,PR,+1.10,+2.00*2F
$NASCRD,165652.62,CR4,H,330.50*56
$NASCRD,165653.52,CR4,P,-0.18*6D
$NASCRD,165653.70,CR4,D,-1.78*7E
$NASCRD,165658.05,CR4,PR,+1.10,+2.00*22
$NASCRD,165659.59,CR4,H,330.50*55
$NASCRD,165702.07,CR4,PR,+1.10,+2.00*2E
$NASCRD,165706.16,CR4,PR,+1.10,+2.00*2A

3.5.3 Use in NaviPac

In NaviPac, the NASNet system can be used for the following interface types:

- **Surface navigation**: the $NASPOS string with BOAT identifier
- **Dynamic positioning**: the $NASPOS string
- **Gyro**: the $NASCRD string with H
- **Motion sensor**: the $NASCRD string with PR
- **Data acquisition**: the $NASCRD string with P, D and T

When used, the input must be separated into a minimum of three physical interfaces (serial or UDP/IP) due to the nature of NaviPac:

- **Surface navigation**
- **Dynamic positioning**
- **Gyro/Motion sensor/Data acquisition**

During setup of the dynamic positioning interface, select which identifier (eg 'ROV1') will be assigned to the object in use – similar to other remote and underwater systems.

Gyro, Motion sensor and Data acquisition also carry an identifier (eg 'CR4'). NaviPac will here perform the identification automatically. If the gyro is attached to an object positioned by NASNet, NaviPac uses the identifier for the corresponding position string to map the data to the NaviPac object.

4 Integration with NaviScan

This section provides some guidelines as to how NaviPac and NaviScan can be interfaced. For detailed information, please refer to the NaviScan reference manual (http://download.eiva.dk/online-training/NaviScan%20manuals/Ns-ref.pdf) and training material.

NaviPac and NaviScan can be run on the same PC or on two separate computers. If running both programs on the same PC, we normally recommend that all interfacing is performed via UDP/IP messages on local IP address 127.0.0.1.

When used on two PCs, you can use serial interfaces (if timing is critical) or UDP/IP.

The following data formats will be discussed:

- Position
- Recording control
- GPS-based height
- Gyro correction
- Expanded setup
- Depth

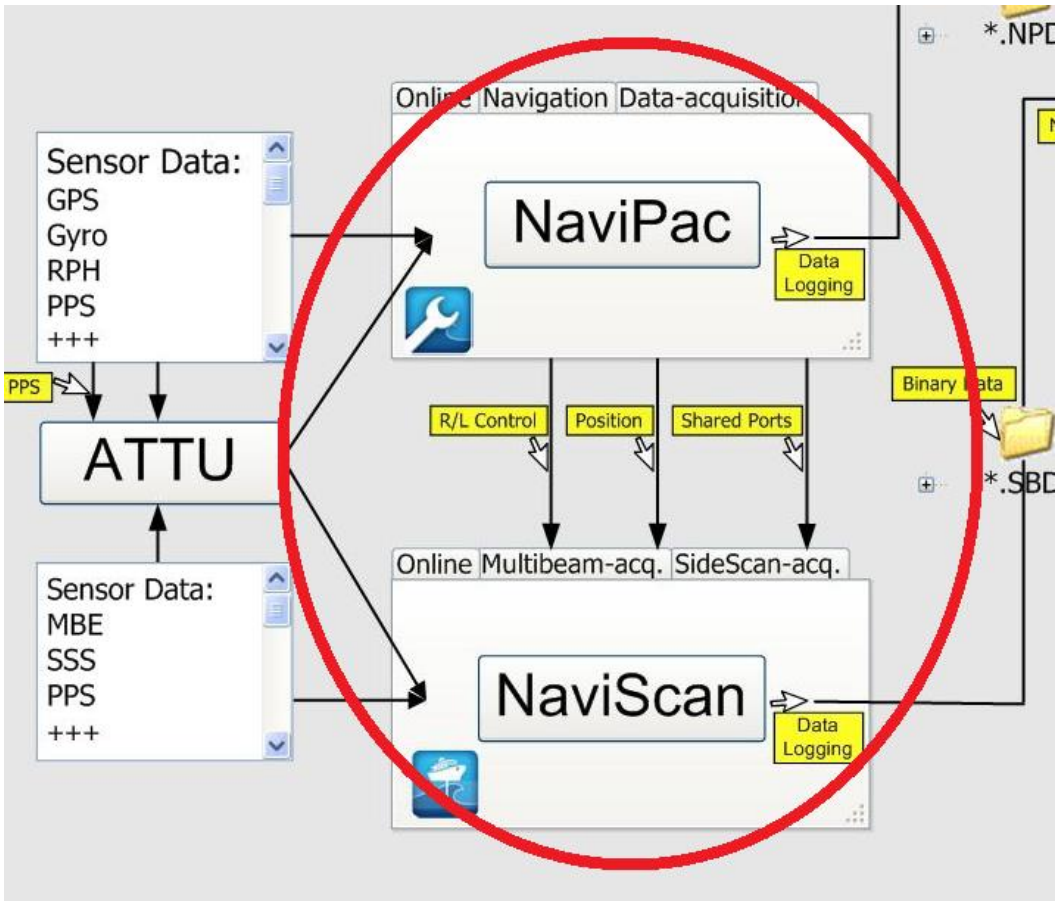


Figure 6 NaviPac and NaviScan data flow

Please note that you should never send gyro and motion sensor data from NaviPac to NaviScan in real operations as this will introduce unknown sensor latency.

4.1 Position

NaviPac can export one or more position telegrams to NaviScan.

We recommend that you use the driver:

NaviPac: Position (Exp.) to NaviScan
NaviScan: Position (exp) from NaviPac

4.2 Recording control

You can let NaviPac (from the Helmsman's Display) control start and stop of recording. We recommend that you use UDP/IP for this.

NaviPac: EIVA runline control
NaviScan: Logging control: NaviPac

4.3 GPS-based height

When performing a vessel-mounted survey based on GPS RTK, you can use the height as a depth reference by sending the heave-compensated height over to NaviScan (called heave correction).

NaviPac: Heave correction and GPS height
NaviScan: NaviPac Heave Cor

4.4 Gyro correction

The output from NaviPac includes an option for sending gyro correction information on to NaviScan. Final correction may be performed in NaviEdit, but to improve online display, you might consider using this option.

The gyro correction value will be incorporated as a part of the Position (Exp.) to NaviScan string.

4.4.1 Dual RTK heading correction

If you have a setup with two RTK-based GPSs, you can use the position data as a secondary gyro. NaviPac then compares the primary gyro (high frequency) with the RTK-based gyro, and you can then send the result to NaviScan for gyro correction.

4.4.2 Correction for speed error

Some gyros are not able to get a position and speed input and will therefore have an error depending on the sailed direction, the speed and the actual location.

/* Formula 'Fulst: Nautische Tafeln, 24. Aufl.', heading in [deg] as acquired from gyro, speed over ground 'sog' in [m/s] latitude in [rad] M_PI_180 is (Pi/180)*/

speedError = asin (-((sog * cos (heading * M_PI_180)) / (464.27 * cos (lat))));

The speed error might be significant, as shown below in Table 1:

Speed		Heading (degrees)							
(m/s)	kn	0	45	90	135	180	225	270	315
0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.25	0.5	-0.062	-0.044	0.000	0.044	0.062	0.044	0.000	-0.044
0.5	1.0	-0.123	-0.087	0.000	0.087	0.123	0.087	0.000	-0.087
0.75	1.5	-0.185	-0.131	0.000	0.131	0.185	0.131	0.000	-0.131
1	1.9	-0.247	-0.175	0.000	0.175	0.247	0.175	0.000	-0.175
1.25	2.4	-0.309	-0.218	0.000	0.218	0.309	0.218	0.000	-0.218
1.5	2.9	-0.370	-0.262	0.000	0.262	0.370	0.262	0.000	-0.262
1.75	3.4	-0.432	-0.305	0.000	0.305	0.432	0.305	0.000	-0.305
2	3.9	-0.494	-0.349	0.000	0.349	0.494	0.349	0.000	-0.349
2.25	4.4	-0.555	-0.393	0.000	0.393	0.555	0.393	0.000	-0.393
2.5	4.9	-0.617	-0.436	0.000	0.436	0.617	0.436	0.000	-0.436
2.75	5.3	-0.679	-0.480	0.000	0.480	0.679	0.480	0.000	-0.480
3	5.8	-0.740	-0.524	0.000	0.524	0.740	0.524	0.000	-0.524
3.25	6.3	-0.802	-0.567	0.000	0.567	0.802	0.567	0.000	-0.567
3.5	6.8	-0.864	-0.611	0.000	0.611	0.864	0.611	0.000	-0.611
3.75	7.3	-0.926	-0.654	0.000	0.654	0.926	0.654	0.000	-0.654
4	7.8	-0.987	-0.698	0.000	0.698	0.987	0.698	0.000	-0.698
4.25	8.3	-1.049	-0.742	0.000	0.742	1.049	0.742	0.000	-0.742
4.5	8.7	-1.111	-0.785	0.000	0.785	1.111	0.785	0.000	-0.785
4.75	9.2	-1.172	-0.829	0.000	0.829	1.172	0.829	0.000	-0.829
5	9.7	-1.234	-0.873	0.000	0.873	1.234	0.873	0.000	-0.873

Table 1 Error in heading due to vessel speed at 60° latitude

4.5 Expanded setup

The data output Nav Settings to NaviScan:

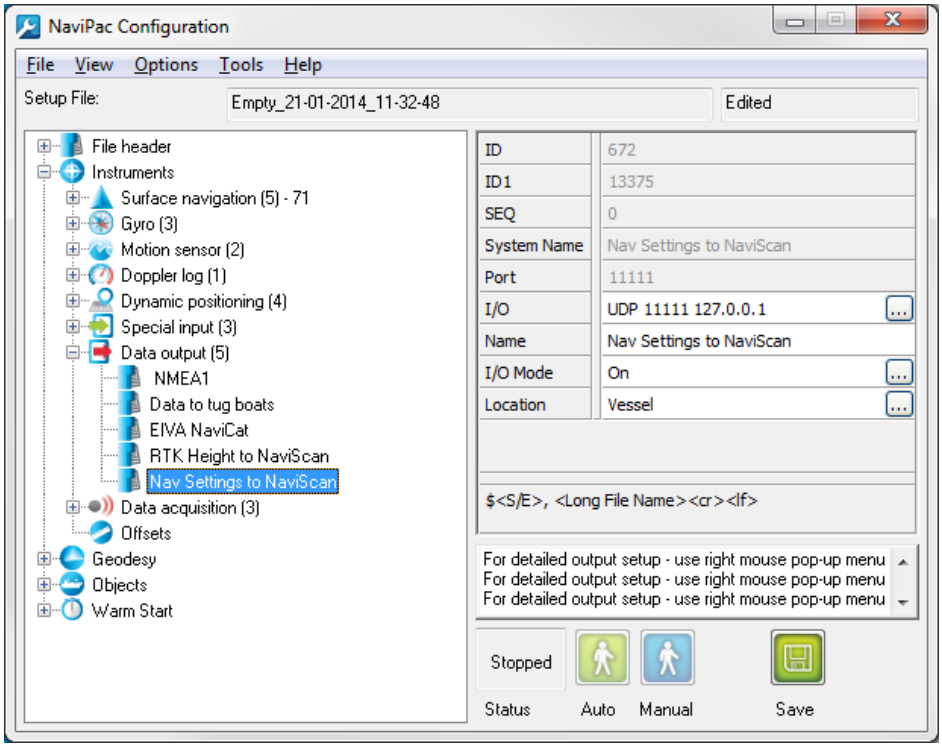


Figure 7 Exporting navigation settings to NaviScan

This data output, as illustrated below, allows transmission of setting and runline information from NaviPac to NaviScan (or similar).

$S,-----000

$PE: PT=5 EN="WGS 84" SMA=6378137.0000 IF=298.2572235630 OS=0.9996000000 OL=9.0000000000 OP=0.0000000000 FE=500000.0000 FN=0.0000 FP=33.0000000000 SP=45.0000000000 UTM=32

$DS: ME=1 TX=89.5000 TY=93.8000 TZ=123.1000 RX=0.0000000000 RY=0.0000000000 RZ=0.0000433300 PPM=-0.0000012000

$INF: 01.02.2002 11:52:02 C:\EIVA\log\NP_INS.INI

$CNF001: [QC]

$CNF002: When=01.02.2002 11:51:58

$CNF003: NumberOfSensors=16

$CNF004: VesselName=MyVessel

$CNF005: [Instrument00]

$CNF006: Type=0.42 Surface Navigation

$CNF007: Name=Ashtech GPS1

$CNF008: Mode=[Sim], IO Type: COM, port: 54 IO: 9600 N 8 1

$CNF009: XYZ=0.000 10.000 0.000

$CNF010: Object=000 MyVessel

$CNF011: [Instrument01]

$CNF012: Type=0.50 Surface Navigation

$CNF013: Name=Racal UKOOA GPS 1

$CNF014: Mode=[Sim], IO Type: COM, port: 20 IO: 9600 N 8 1

$CNF015: XYZ=0.000 0.000 0.000

$CNF016: Object=000 MyVessel

$CNF017: [Instrument02]

….

$CNF128: Channel3=MAG2

$CNF129: XYZ3=0.300 0.000 0.000

$CNF130: InUse3=1

$CNF131:

$END: 01.02.2002 11:52:02 C:\EIVA\log\NP_INS.INI

‘CNF’ represents an INI-like copy of the NaviPac setup, including one section per instrument.

Due to the amount of data, we suggest that you use UDP/IP for this.

4.6 Depth

NaviScan is configured to send out the observed centre depth (depth below keel) on a UDP/IP port. This can be read in NaviPac using a standard NMEA input:

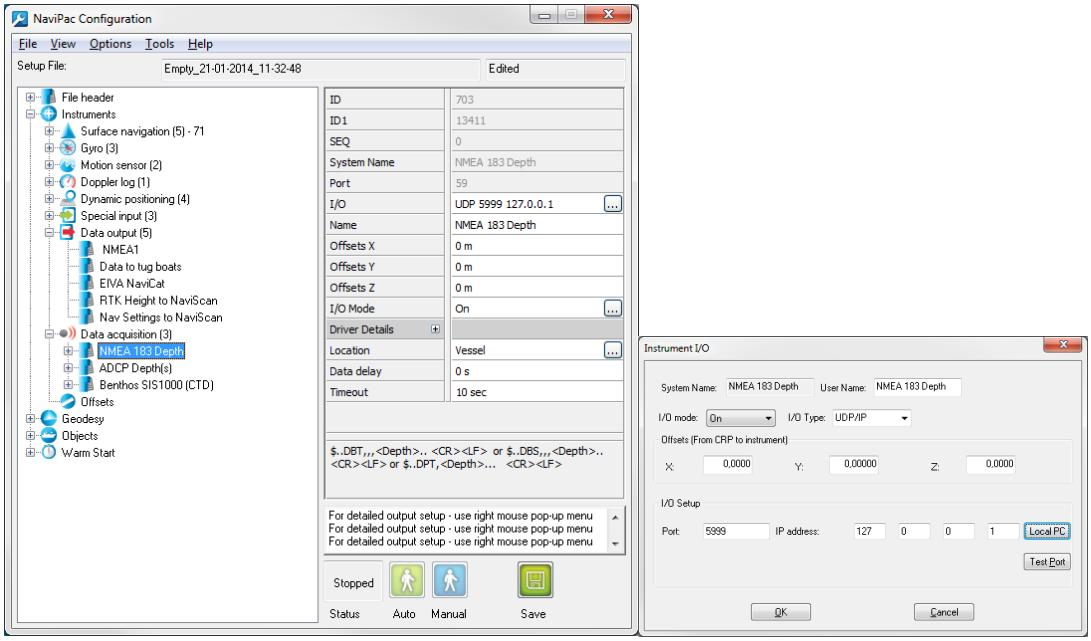


Figure 8 Importing centre depth into NaviPac

The UDP/IP port must always be '5999', and the IP address must be the local address.

4.7 Summary

NaviPac	NaviScan
Position to NaviScan	Pos from NaviPac Logging control: NaviPac old
Position (Exp.) to NaviScan	Position (exp) from NaviPac
Gyro and age to NaviScan	NaviPacCalcGyro
RTK height to NaviScan	Bathy: Simrad
Heave correction and GPS height	NaviPac Heave Cor
EIVA runline control	Logging control: NaviPac
Nav Settings to NaviScan	Logging control: NaviPac (passive)

Table 2 Summary of all possible integrations with NaviScan

5 Sharing ports between NaviPac and NaviScan

NaviPac offers a feature to share COM ports with NaviScan (or other external receivers). This is done by sending the time-tagged data (registered by NaviPac) out on the UDP/IP network using the TimeBox/ATTU data format:

```
{
char            Ident[4];       // Packet starter: always 'EIVA'
INT32           Length;         // Length of packet - remaining of entire packet
INT32           VersAndDomain;  // First 16 bit version number (1)
                                // Last 16 bit domain id - unique time box number
INT32           InsId;          // Id of instrument - version 1 COM port number
TIMEVAL         time_stamp;     // Timestamp of reception of telegram (first bit)
}
char            data [length-16];
                                // The raw telegram - not really a part of
                                // structure - but follows right after the header
```

Data is kept in four-byte structures to avoid any discussions on special alignments. Where TIMEVAL is found in the general sys/time.h header file.

In Windows it is defined as:

```
struct timeval {
        long        tv_sec;  /* seconds */
        long        tv_usec; /* and microseconds */
};
```

And in UNIX/Linux:

```
struct timeval {
        time_t      tv_sec   //  seconds
        suseconds_t tv_usec  //  microseconds
};
```

The reasons for selecting this protocol are:

- The data is delivered with time-tag as per NaviPac – thus delivered in a consistent way
- Several programs use the ATTU (TimeBox) protocol and can use this directly

5.1 Setup in NaviPac

You must enable the port sharing functionality in **NaviPac Configuration** via **Options > Global Parameters > NaviScan > Enable port sharing**.

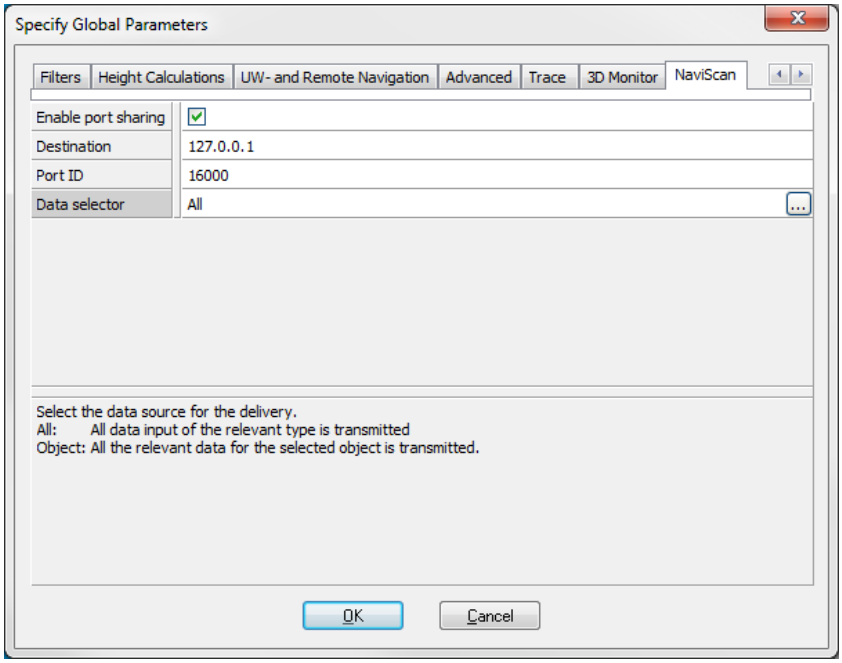


Figure 9 Exporting shared setup from NaviPac

Enable port sharing
Define whether NaviPac should export data from data inputs to NaviScan and thus enable port sharing between the two programs without losing time-tagging accuracy. This is only applicable for serial (COM) inputs from:

- GPS
- Gyro
- Motion sensor
- Doppler log
- Bathy

Port sharing can be used on same PC or on remote PC(s).

Destination
Enter the destination address of the receiver computer, eg:

- 10.10.1.33 For specific PC receiving the data
- 10.10.1.255 For broadcast to multiple receivers on same subnet
- 127.0.0.1 For local PC only

Port ID
The data will be sent out as UDP/IP messages using the TimeBox format. Each serial port will be output on its own UDP port, defined by the original port number plus this add-on. If you, for example, enter '10000', then COM1 will be sent on UDP 10001.

Data selector
Select whether you want NaviPac to broadcast all inputs ('All') or only for a selected object (eg 'ROV1'). The changes in setup will not be available until the next restart of navigation.

5.2 Setup in NaviScan

The drivers that have been enabled for port sharing in NaviPac can be imported into NaviScan by using the ATTU (TimeBox) interface:

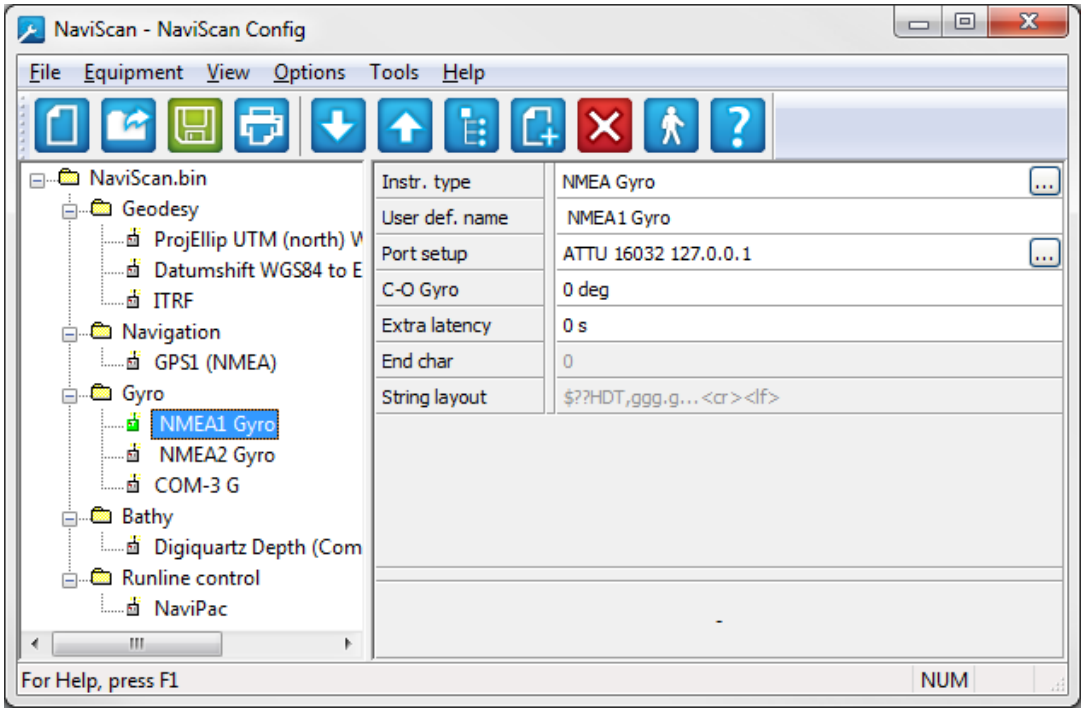


Figure 10 Imported shared setup

The key is to know the mapping between the NaviPac drivers and the NaviScan drivers so you select the correct driver in both programs.

The mapping can be automated in NaviScan via an import function that guides you through this mapping.

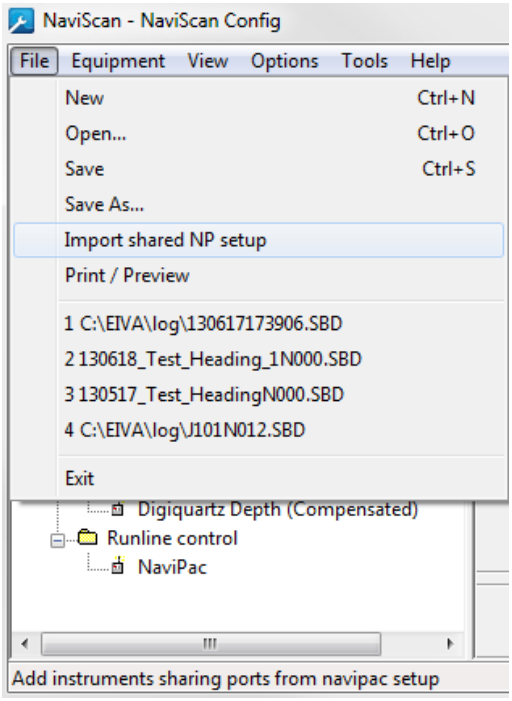


Figure 11 Importing the setup

Please note that the NaviScan PC must be time-synchronised with the NaviPac PC when using two different locations. This can either be done via interfacing of ZDA/PPS or by using the network time server.